MEYLE

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High-Speed Micro PLC
Cam Controller

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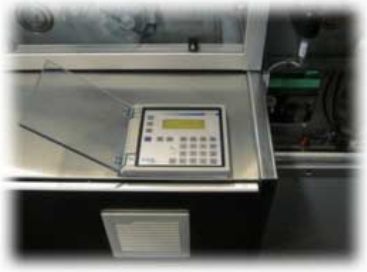
MEYLE cam controller are known for nearly 50 years. As one of the first enterprises we presented cam switching devices with stored program already more than 20 years ago the first microprocessor-controlled ones. Now our customers profit from the large experience. The newest generation: EPC...

Completely again and likewise superfast: SPEEDY. So clever, small and inexpensive could PLC controls be!

Simple installation and operation are just as natural as extensive accessories, from the cable connection to the PC software. Use our long experience, lower your costs!

Our automation components work daily in the hard industrial employment, e.g. machine tool manufacture, building of packing machines, conveying engineering, food industry.....

MEYLE supplies a multiplicity of customized variants and special solutions apart from the standard components - ask us!



Safety Warnings

It is intended for qualified personnel familiar with the installation, commissioning or maintenance of the machine equipped with MEYLE control devices.

The user manuals do not substitute the machine's operating instructions. This must provide separate coverage of the controller functions used in the particular application and explain the effect these have on the machine.

Particular attention must be paid to the safety concept underlying the overall project. Supplementary safety precautions ensuring defined, safe operating statuses irrespective of the control and operating equipment must be taken in all areas where, in conjunction with automation components, faults are able to cause material damage or personal injury.

Pertinent accident prevention regulations must be observed. Emergency stop circuits to EN 60204 (VDE0133) must remain in effect in all operating modes and must not result in any undefined restart when released.

Reliable electrical isolation in the form of a transformer to VDE0551 must be provided when using 24VDC EPC control devices.

Apart from the measures described in the installtion sheets, no action must be carried out inside the device.

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Programmable Cam-Controller EPR48

Cam controllers are employed everywhere, where actors must be marked exactly in firm assignment to the machine positions, for instance at packaging machines. The EPR48 is a high performance cam-controller with a 16-bit-processor system and memory-programming capacity. It has fully electronic control over the activities of processing machines or systems. A connected shaft - or path encoder picks up the momentary machine position and transfers this information to the EPR48, which activates the respective outputs according to the program.

- *Absolute shaft encoder up to 1000 r.p.m*
- *Automatic dead time/delay-time correction*
- *Program optimizing during operation*
- *Easy programming via integrated keyboard*
- *No programming unit required*
- *32 programs*
- *Realtime operating system for highest speed*
- *Operator terminal and PLC in one unit*

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Thanks to clear text-conversation programming is very simple and can be learnt in a very short time. 9 keys without complicated double-functions are sufficient, even for complex program inputs.

Even clear text-dialogues can be programmed as desired.

All outputs are selected as frequently as desired without loss of speed.

EPR48 has a real time multitasking operating system without firm cycle times. Thus an optimum at speed is reached.

It is possible to store and select 32 complete programs by manual keyboard entry or external controls. These different programs can be copied as desired, even in segments.

Simple connection to PLC, machine terminals or personal computers is possible via 48 digital control outputs or serial interface.

Efficient correcting functions, e.g. static angle correction or correction for selected outputs are possible in operation.

An automatic delay-time compensation function (dead-time) in operating processors automatically compensates the mechanical delay of connected servo components. A different delay-time compensation can be determined for each output, also separately to the rising or falling edge. The necessary angular advance is continuously calculated as a function of the machine operating speed, thus achieving a proportional time advance of the output signals. It is sufficient to enter one optional delay-time per output in milliseconds.

Current operational data, e.g. machine operating speed, position, angle etc. are indicated on the clear-text-display. A variable conversion factor allows a display in different units of length (e.g. m, mm, inch). As an option current process data can be obtained via serial interface.

The **EPR48** is integrated in a compact panel case with dirt-insensitive foil-coated processure point keys. The modular electronics are based on European standard size pc boards. All components can be replaced at the rear side without disassembling the device.

Your packaging machine or production facility will be more intelligent, more flexible, faster and user-friendlier with **EPR48**.

If you are not convinced by now you should talk to us - we integrate even your most unusual special requirements.

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Programmable Cam-Controller EPR48

Installation:

Operation voltage: AC 230V/115V
Mains frequency AC: 50-60Hz
Power consumption: approx. 20VA
Temperature range: 0° - 40°C
Protection: IP54 front
Weight: approx. 3000g
Fitting position: as desired

Shaft Encoder-Connection

Resolution: 10-bit-binary input,
Electrically separated,
Integr. power supply: DC 12V, 250mA
Input voltage: DC 10-30V
Input frequency: max. 6000Hz,
1000 r.p.m. at 360 steps / revolution

Outputs

48 transistor outputs
DC 10-60V, 100mA, plus-switching
Electrically separated by optocoupler
2 European standard size pc boards with 24 outputs each
Front LED-display
Rear 37-pole Sub-D plug-in connection
Optional:
24 outputs 100mA
32 outputs 0.5A short-circuit proof

Program Alternation Input

6 bit binary, 1 transfer signal
DC 10-30V electrically isolated

Processor System

16-bit-CMOS processor system
16MHz system cycle, 32MHz clock
64KB EPROM, 192KB RAM
Battery-buffered, with retentive memory

Display

12-digit LED-dot matrix red
All ASCII-characters, special characters
Height of symbols 5.08mm
3 adjustable brightness levels
readability up to 5m

Keys

Integrated foil-coated keys with pressure point, 9 keys, IP65

Serial Interface

V24, RS232-level, 300-9600 baud

Programming

Integrated programming unit
clear text-dialogue entry via keys or personal computer
Text-display programmable as desired (option)
Optional release by external key-operated switch,
As many circuit-areas as desired without loss of speed,
Comfortable input functions for
- Input of new switching areas
- Alterations
- Documentation
- Deleting output-switching areas
- Deleting whole program
- Program selection
- Program (segment) copying
- Static angle correction
- In-operation correction
- Delay-time correction per output
- Installation
- Program load / safe

Self-Monitoring

Watch-Dog with control-output
Memory-check
Transfer-check serial interface
Shaft encoder control of unacceptable data
Overspeed

Mechanical Construction

Sturdy plastic case in accordance with DIN 144x144mm
Front: foil-coated keys on aluminium supported-place
Printed circuit boards in European format replaceable on rear side without disassembly of case
All electrical connections on rear side with screw-type plug connectors
Mains and key-operated switch on screw terminals connection

Shaft Encoder EPR-WG

EPR-WG3 binary: Order-No. 585482
Resolution: 1 degree, 0-359 binary
Voltage: DC 10-24V
Current consumption: 200mA
Outputs: 20mA short-circuit proof
Protection category: IP65
Temperature range: 0° to 55°C
Weight: 500g
Vibration: 100m/s² (10-10000Hz)
Connection: plug-in terminal IP54
Cable length: 3m, 5m, 10m (option)
(see separate datasheet)

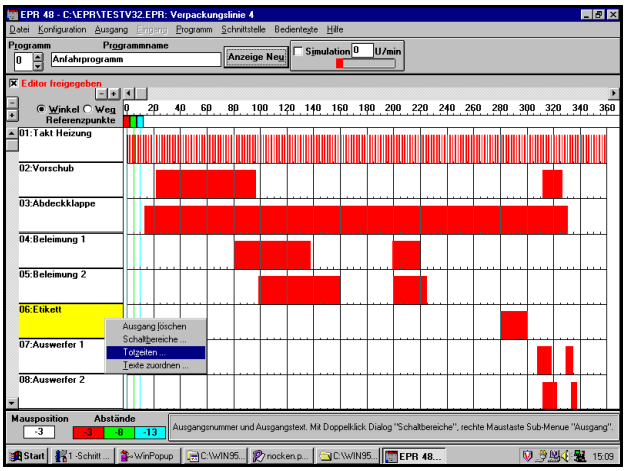
Accessories

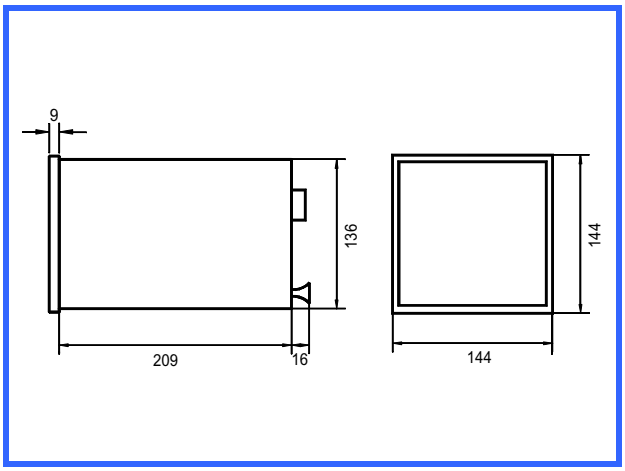
EPRPRO for WINDOWS:
PC-software for programming
- data transfer
- text editing, documentation

cable for serial interface 2m,
- 2x Sub-D-plug-in connection 25-pol.
- Order-No. 585732

cable for serial interface 2m,
1x Sub-D-plug-in connection 25-pol.
1x Sub-D-plug-in connection 9-pol.
Order-No. 585733

Order-No	Type
585700	EPR48 AC 230V, 48 Outputs
585701	EPR48 AC 115V, 48 Outputs
585702	EPR48/2 AC 230V, 24 Outputs
585703	EPR48/2 AC 115V, 24 Outputs
585716	EPRPRO für Windows 9x,NT,XP
585882	User manual EPR english





EPRPRO for Windows - programming couldn´t be easier.

The PC-Software for all EPR/EPC-devices.

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Programmable Cam Controller EPR16

The EPR16 is a programmable cam controller with a 16-Bit-processorsystem. Your packaging machine or production facility will be more intelligent, more flexible, faster and user friendlier with EPR16. A connected absolute angle encoder picks up the momentary machine position, transfers this information to the EPR16, which activates the respective outputs according to the program.

- *Absolute shaft encoder up to 500 r.p.m*
- *Automatic dead time/delay-time correction*
- *Program optimizing during operation*
- *Easy programming via integrated keyboard*
- *No programming unit required*
- *32 programs*
- *Realtime operating system for highest speed*
- *Operator terminal and PLC in one unit*

5

Simplest programming and operation

Programming effected after flow chart, it is very simple and within shortest time easy to learn by plain language dialogue. 9 keys are sufficient for the program input of also complex applications. The plain language dialogue is freely programmable and thus for example possible in different languages. Each output can be arbitrarily frequently switched without lost of speed.

32 programs directly in the access

32 complete programs can be stored and selected by keyboard input. The different programs can be copied, also segment by segment.

Simple interconnection with PLC

A simple interconnection with PLC, machine terminal or personal computer is possible over the 16 digital switching exits or the serial V.24 interface.

Program optimizing during operation

Efficient correcting functions, e.g. static angle correction or correction for selected outputs are possible in operation.

Integrated fully automatic delay-time compensation

An automatic delay-time compensation function (dead-time) in operating processors automatically compensates the mechanical delay of connected servo components. A different delay-time compensation can be determined for each output, also separately to the rising or falling edge. The necessary angular advance is continuously calculated as a function of the machine operating speed, thus achieving a proportional time advance of the output signals. It is sufficient to enter one optional delay-time per output in milliseconds.

Information about clear text display and ser. interface

Current operational data, e.g. machine operating speed, position, angle etc. are indicated on the clear-text-display. A variable conversion factor allows a display in different units of length (e.g. m, mm, inch). As an option current process data can be obtained via serial interface.

Durably, compactly and reliably

The EPR16 is integrated in a compact panel case with dirt-insensitive foil-coated processure point keys. The modular electronics are based on European standard size PC boards. All components can be replaced at the rear side without disassembling the device.

Extensive supporting PC software

With ***EPRPRO for Windows*** we additionally offer an extremely efficient PC software for programming with graphic support inclusive program printout, documentation, programming of the plain language display as well as data communication on disc.

Additional components

To the cam controller **EPR16** we also supply suitable absolute gray code or binary code encoders, see separate data sheet.

Our experience - your advantage

Whether packing machines, cleaning machines, labelling machines, textile machines, manufacturing automats - with **EPR16** you control intelligent, fast, flexible, safe and convenient.

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Programmable Cam Controller EPR16

Installation

Operating voltage: AC 230V/115V,
DC 24V, +-10%
Mains frequency AC: 50-60Hz
Residual ripple DC: < 5%
Power consumption: approx. 14VA
Temperature range: 0 - +40° C
Protection: IP65 front
Weight: approx. 1300g
Fitting position: as desired

Shaft Encoder Connection

Resolution: 10-bit binary/Gray code input, electrically separated
Integr. power supply: DC 12V, 250mA
Input voltage: DC 10-30V
Input frequency: max. 3500Hz
binary: 500 r.p.m. with 360 steps / revolution
gray: 400 r.p.m. with 360 steps / revolution

Outputs

16 transistor outputs
DC 10-60V, 100mA, plus-switching electrically separated by optocouplers,
Rear 37-pol. SUB-D plug-in connection

Serial Interface

V24, RS232-level, 300-9600 baud

Processor System

16-Bit-CMOS processor system
8MHz system cycle, 16MHz clock
32KB EPROM / 128KB RAM
Battery-buffered, with retentive memory

Display

12-digit LED-dot matrix red
All ASCII characters, special characters
Height of symbols 5.08 mm
3 adjustable brightness levels
Readability up to approx. 5m
current display alternatively angles
- Machine speed
- Correction angle
- Program number
- Switching status of outputs

Keys

Integrated foil-coated keys with pressure point, 9 keys, IP65

Programming

integrated programming unit
clear text-dialogue entry via keys or personal computer
Text-display programmable as desired
optional release by external key-operated switch
as many circuit-areas as desired without loss of speed
comfortable input functions for
- Input of new switching areas
- Alterations
- Documentation
- Deleting switching areas
- Deleting whole program
- Program selection
- Program(segment) copying
- Static angle correction
- In-operation correction
- Delay-time input for each output
- Installation
- Program load / safe

Self-Monitoring

Watch Dog with control-output
Memory check
Transfer check serial interface
Shaft encoder control of unacceptable data
Overspeed

Mechanical Construction

Sturdy plastic case in accordance with DIN 144x144mm
Front: foil-coated keys IP65 on aluminum supported place
All connections on rear side with plug-in terminals.

Shaft Encoder EPR-WG2 / EPR-WG3

EPR-WG2 gray: Order-No. 585480
EPR-WG3 binary: Order-No. 585482
Resolution: 1 degree, 0-359
Voltage: DC 10-24V
Current consumption: 200mA
Outputs: 20mA, short circuit proof
Protection: IP65
Temperature range: 0° to 55° C
Weight: 500g
Vibration: 100m/s² (10-10000Hz)
Connection: Plug-in terminal IP54

Accessories

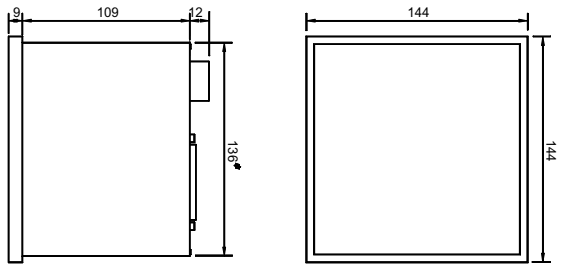
EPR16-RE: plug-in card with 16 relay outputs for each 3A/250V
Order-No. 485450

EPR16-OK: plug-in card with 16 short circuit proof transistor outputs for each DC 10-30V / 0,5A
Order-No. 485455

EPRPRO V3.x for Windows XP, 2000, 9x:
PC software for programming, data transfer, text editing, documentation
Order-No. 585716 german

Cable for serial interface 2m,
2x Sub D plug-in connection 25-pol.
Order-No. 585732

Cable for serial interface 2m,
1x Sub D plug-in connection 25-pol.
1x Sub D plug-in connection 9-pol.
Order-No. 585733



Order-No	Type
585405	EPR 16GT AC230V, Graycode
585406	EPR 16GT AC115V, Graycode
585407	EPR 16GT DC24V, Graycode
585415	EPR 16BT AC230V, Binary code
585416	EPR 16BT AC115V, Binary code
585417	EPR 16BT DC24V, Binary code
585450	EPR16-RE Relay-output-card
585455	EPR16-OK Optocoupler-output-card
585882	User manual EPR english

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Programmable Cam Controller EPC48

Cam controllers are employed everywhere, where actors must be marked exactly in firm assignment to the machine positions, for instance at packaging machines. The EPC48 is a high performance cam-controller with a 16-bit-processor system and memory-programming capacity. It has fully programmable control over the activities of processing machines e.g. packaging machines or glue machines. A connected shaft - or path encoder picks up the momentary machine position and transfers this information to the EPC48, which activates the respective outputs according to the program. Text display and programming unit are integrated.

- *Absolute shaft encoder up to 1000 r.p.m*
- *Automatic dead time/delay-time correction*
- *Program optimizing during operation*
- *Easy programming via integrated keyboard*
- *No programming unit required*
- *32 programs*
- *Realtime operating system for highest speed*
- *Operator terminal and PLC in one unit*

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Thanks to clear text-conversation programming is very simple and can be learnt in a very short time. The clear text-dialogues can be programmed in different languages.

All outputs are selected as frequently as desired without loss of speed. **EPC48** has a real time multitasking operating system without firm cycle times. Thus an optimum at speed is reached.

It is possible to store and select up to 32 complete programs by manual keyboard entry or external controls. These different programs can be copied as desired, even in segments.

Simple connection to PLC, machine terminals or personal computers is possible via digital control inputs / outputs or serial interface.

Efficient correcting functions, e.g. static angle correction or correction for selected outputs are possible in operation.

An automatic delay-time compensation function (dead-time) in operating processors automatically compensates the mechanical delay of connected servo components.

A different delay-time compensation can be determined for each output, also separately to the rising or falling edge.

The necessary angular advance is continuously calculated as a function of the machine operating speed, thus achieving a proportional time advance of the output signals. It is sufficient to enter one optional delay-time per output in milliseconds.

Current operational data, e.g. machine operating speed, position, angle etc. are indicated on the clear-text-display. A variable conversion factor allows a display in different units of length (e.g. m, mm, inch). As an option current process data can be obtained via serial interface.

The **EPC48** is integrated in a compact panel case with dirt-insensitive foil-coated processure point keys. The modular electronics are based on European standard size pc boards. All components can be replaced at the rear side without disassembling the device.

Your packaging machine or production facility will be more intelligent, more flexible, faster and user-friendlier with **EPC48**.

If you are not convinced by now you should talk to us - we integrate even your most unusual special requirements.

EPC48 – ***40 years industrial experience of cam controllers lies in it.***

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Programmable Cam Controller EPC48

Installation
Operating voltage: AC 230V/115V
Mains frequency AC: 50-60Hz
Residual ripple < 5%
Power consumption: approx. 20VA
Temperature range: 0 - +40°C
Protection: IP65 front
Weight: approx. 3000g
Fitting position: as desired

Shaft encoder-Connection
Resolution: 10-bit-binary input
electrically isolated
360/1000 steps / revolution
Integr. power supply. DC 12V, 250mA
Input voltage: DC 10-30V
Input frequency: max. 7000Hz
1000 r.p.m. at 360 steps/revolution

Outputs
48 transistor outputs
DC 10-60V, 100mA, plus-switching
Electrically separated by optocoupler
2 European standard size pc boards with 24 outputs each
Rear 37-pole Sub-D plug-in connection
Optional:
24 Outputs 100mA
32 Outputs 0.5A

Program Alternation Input
6 bit binary, 1 transfer signal
DC 10-30V electrically isolated

Serial Interface
V24, RS232-level, 300-9600 baud

Processor System
16-bit-CMOS processor system V50
32MHz Clock
128KB EPROM, 896KB RAM
Battery-buffered, with retentive memory

Display
4x20 characters LCD yellow/black
supertwisted, behind-shined
Hight of symbols approx. 5 mm

Keys
Integrated foil-coated keys with pressure point, number block, cursor controlling and function keys, IP65

Programming
Integrated programming unit
Clear text-dialogue entry via keys or personal computer
Optional release by external key-operated switch
As many circuit-areas as desired without loss of speed
Comfortable input functions for
- input of new switching areas, alterations, documentation, deleting output-switching areas, deleting whole program, program selection, program (segment) copying, static angle correction, in-operation correction, delay-time entry per output, installation,
- program load / safe
- Test/initialization routine

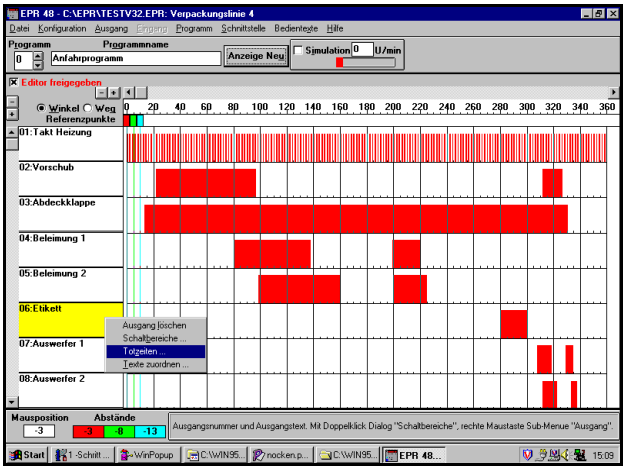
Self-Monitoring
Watch-Dog with control-output
Memory-check
Transfer-check serial interface
Shaft encoder control of unacceptable data
overspeed

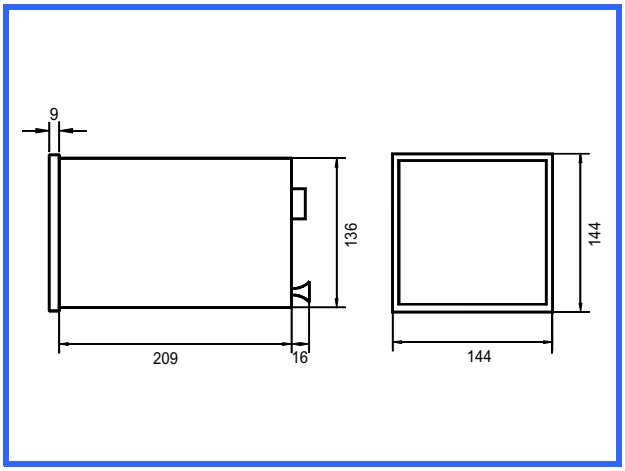
Mechanical Construction
Sturdy plastic case in accordance with DIN 144x144mm
Front: foil-coated keys IP65 on aluminium support-place
Printed circuit boards in European format replaceable on rear side without disassembly of case
All electrical connections on rear side with plug-in terminals
Mains connections and key-operated switch with screw-type plug-in connectors

Shaft encoder EPR-WG3
EPR-WG3 binary: Order-No. 585482
Resolution: 1 degree, 0-359
Voltage: DC 10-24V
Current consumption: 200mA
Outputs: 20mA, short-circuit-proof
Protection: IP65
Temperature range: 0 - 55°C
Weight: approx. 500g
Vibration: 100m/s² (10-10000Hz)
Connection: plug-in connector IP54
Cable length: 3m, 5m, 10m (Option)
(see seperate data-sheet)

Accessories
EPRPRO for Windows:
PC-Program for programming,
data-transfer,
text editing, documentation
Cable for serial Interface 2m,
2x Sub-D-plug-in connection 25-pol.
Order-No. 585732
Cable for serial Interface 2m,
1x Sub-D-plug-in connection 25-pol.
1x Sub-D-plug-in connection 9-pol.
Order-No. 585733

Order-No	Type
585740	EPC48 AC 230V, 48 Outputs
585741	EPC48 AC 115V, 48 Outputs
585742	EPC48/2 AC 230V, 24 Outputs
585743	EPC48/2 AC 115V, 24 Outputs
585716	EPRPRO for Windows 9x,NT,XP
585884	User manual EPC english





EPRPRO for Windows - programming couldn´t be easier.

The PC-Software for all EPR/EPC-devices.

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Programmable Cam-Controller EPC16

The EPC16 is a programmable cam-controller of the upper performance class equipped with 16-bit-processor-system. Your packaging machine or production facility will be more intelligent, more flexible, faster and user friendlier with EPC16. A connected absolute angle encoder picks up the momentary machine position, transfers this information to the EPC16, which activates the respective outputs according to the program. Keys, text display and programming unit are integrated.

- *Absolute shaft encoder up to 500 r.p.m*
- *Automatic dead time/delay-time correction*
- *Program optimizing during operation*
- *Easy programming via integrated keyboard*
- *No programming unit required*
- *8 programs*
- *Realtime operating system for highest speed*
- *Operator terminal and PLC in one unit*

5

Simplest programming and operation

Programming effected after flow chart, it is very simple and within shortest time easy to learn by plain language dialogue. The dialogue is possible in different languages.

Current operational data such as machine speed, position, angle etc. are shown on the text display. By a variable conversion factor the display can be made also in units of length (e.g. m, mm, inch). Furthermore the current process data are spent over the serial interface.

EPC16 can be programmed optionally with the PC-Software EPRPRO for Windows®.

All outputs are selected as frequently as desired without loss of speed. **EPC16** has a real time multitasking operating system without firm cycle times. Thus an optimum at speed is reached.

It is possible to store and select up to 32 complete programs by manual keyboard entry or external controls. These different programs can be copied as desired, even in segments.

Simple connection to PLC, machine terminals or personal computers is possible via digital control inputs / outputs or serial interface.

The **EPC16** is integrated in a compact panel case with dirt-insensitive foil-coated processure point keys.

Efficient correcting functions, e.g. static angle correction or correction for selected outputs are possible in operation.

An automatic delay-time compensation function (dead-time) in operating processors automatically compensates the mechanical delay of connected servo components.

A different delay-time compensation can be determined for each output, also separately to the rising or falling edge.

The necessary angular advance is continuously calculated as a function of the machine operating speed, thus achieving a proportional time advance of the output signals. It is sufficient to enter one optional delay-time per output in milliseconds.

Our experience - your advantage

Whether packaging machines, cleaning machines, labelling machines, textile machines, manufacturing automats - with **EPC16** you control intelligent, fast, flexible, safe and convenient.

Meyer Industrie-Electronic GmbH – MEYLE
Carl-Bosch-Straße 8 Tel.: (+49) 05481-9385-0 Internet: www.meyle.de
49525 Lengerich/Germany Fax: (+49) 05481-9385-12 E-Mail: sales@meyle.de

Programmable Cam-Controller EPC16

Installation

Operating voltage: AC 230V/115V
DC 24V, +-10%
Mains frequency AC: 50-60Hz
Residual ripple DC: < 5%
Power consumption: approx. 10VA
Temperature range: 0 - +40°C
Protection: IP65 front
Weight: approx. 1400g
Fitting position: as desired

Shaft Encoder Connection

Resolution: 10-bit-binary / gray code input, electrically isolated,
360/1000 steps / revolution
Integr. power supply. DC 12V, 250mA
Input voltage: DC 10-30V
Inut frequency: max. 3500Hz
500 r.p.m. with 360 steps / revolution

Outputs

16 transistor outputs
DC 10-60V, 500mA, plus-switching
Electrially separated by optocoupler
Rear 37-pol. Sub-D plug-in connection
Optional:
16 relay outputs AC 250V/5A via plug-in relay card

Serial Interface

V24, RS232-level, 300-9600 baud

Processor System

16-Bit-CMOS V25-Processor-system
64KB EPROM, 128KB RAM
Battery-buffered, with retentive memory

Display

4x20 characters LCD yellow / black
supertwisted, behind-shines
Hight of symbols approx. 5 mm

Keys

Integrated foil-coated keys with
pressure point, number block, cursor controlling and function keys, IP65

Programming

integrated programming unit
Clear text dialogue entry via keys or personal computer
Optional release by external key-operated switch
As many circuit-areas as desired without loss of speed
Comfortable input functions for
- input of new switching areas,
- alterations, documentation, deleting output switching areas,
- delete whole program,
- program selection,
- program(segment) copying,
- static angle correction,
- in-operation correction,
- delay time input for each output, installation
- programs load / safe
- test / initialization routine

Self-Monitoring

Watch Dog with control output
Memory check
Transfer check serial interface
Shaft encoder control of unacceptable data
Overspeed

Mechanical structure

Strudy plastic case in accordance with DIN 144x144mm
Front: foil-coated keys IP65 on aluminium support-place
All connections on rear side with plug-in terminals
Mains connection and key-operated switch with screw-type plug-in connectors

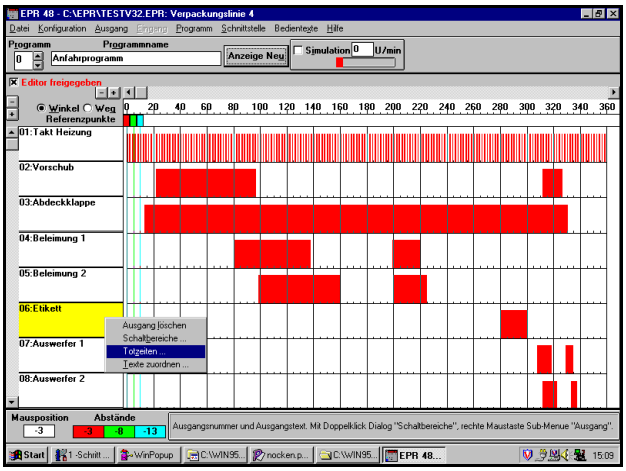
Shaft Encoder EPR-WG2/EPR-WG3

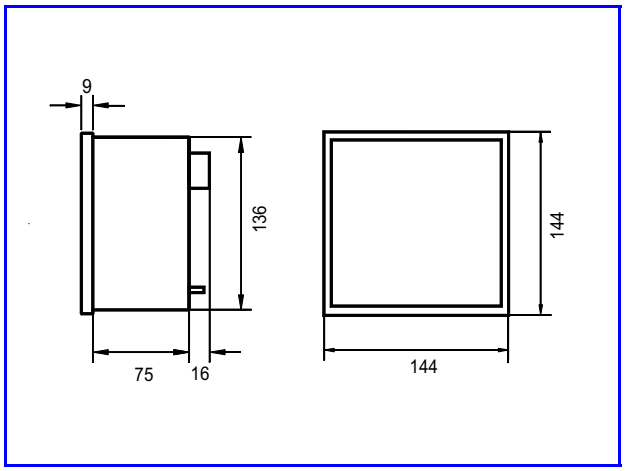
EPR-WG2 gray: Order-No. 585480
EPR-WG3 binary: Order-No. 585482
Resolution: 1 degree, 0-359
Voltage: DC 10-24V
Current consumption: 200mA
Outputs: 20mA, short circuit proof
Protection: IP65
Temperature range: 0° to 55°C
Weight: 500g
Vibration: 100m/s 2 (10-10000Hz)
Connection: plug-in connector IP54
Cable length: 3m, 5m, 10m (option)
(see separate data sheet)

Accessories

EPR16-RE: plug-in card with 16 relay outputs for each AC 250V/3A
Order-No. 485450
EPRPRO for Windows, Order-No. 585716:
PC software for programming,
Data transfer,
Text editing, documentation german
Cable for serial interface 2m,
2x Sub D plug-in connection 25-pol.
Order-No. 585732
Cable for serial interface 2m,
1x Sub D plug-in connection 25-pol.
1x Sub D plug-in connection 9-pol.
Order-No. 585733

Order-No	Type
585200	EPC16GT AC230V, Graycode
585201	EPC16GT AC115V, Graycode
585202	EPC16GT DC24V, Graycode
585210	EPC16BT AC230V, Binary code
585211	EPC16BT AC115V, Binary code
585212	EPC16BT DC24V, Binary code
585450	EPR16-RE Relaiy-output-card
585716	EPRPRO für Windows 9x,NT,XP
585884	User manual EPC english





EPRPRO for Windows - programming couldn´t be easier.

The PC-Software for all EPR/EPC-devices.

Meyer Industrie-Electronic GmbH – MEYLE
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49525 Lengerich/Germany Fax: (+49) 05481-9385-12 E-Mail: sales@meyle.de

The EPR48S combines the technical advantages of a programmable logic controller (PLC) with a maximum of operator convenience. Program unit, operator guidance and controller are integrated in one device. Thanks to clear text-conversation programming is very simple and can be learnt in a very short time. 9 keys without complicated double-functions are sufficient, even for complex program inputs.

- *Editing, deleting and documentation of the operating states of the outputs*
- *Editing, deleting and documentation of the input combination*
- *20 complete programs*
- *Copying program segments or whole program*
- *Any program jumps*
- *By using the internal time base, each step time between 1 ms and 99.9 min is possible*
- *48 outputs, 8 inputs, input for external clock– and reset input*
- *Changing clear text display during operation, e.g. for displaying steps or speed*
- *Serial Interface for data transfer to PC/PLC*
- *Output of the running process data, e.g. machine position or speed via the serial interface*
- *Programmable with EPRPRO for WINDOWS via PC*

5

Thanks to clear text-conversation programming is very simple and can be learnt in a very short time. 9 keys without complicated double-functions are sufficient, even for complex program inputs.

Neither external progamming devices are neccessary, nor the knowledge of a program language. The operating states of the outputs and the combinations of the inputs are entered by transferring the sequence diagram into the controller.

The device is integrated in a splash and dust proofed compact panel case with dirt-insensitive foil-coated processure point keys. The modular electronics are based on European standard size PC boards. All components can be replaced at the rear side without disassembling the device.

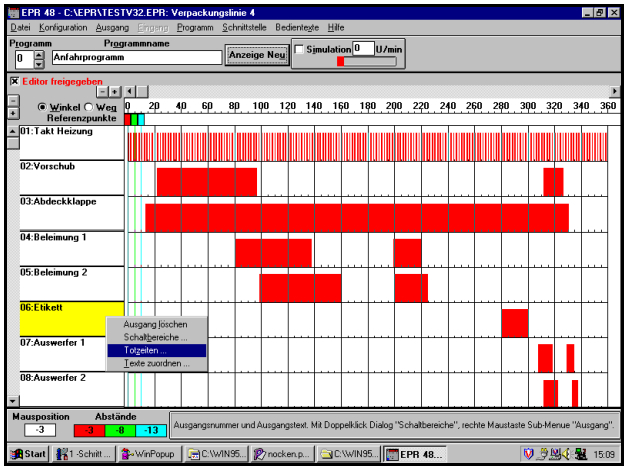
The **EPR48S** solves many varying control tasks:

- complex sequential controls over time, also dependent on input signals, e.g. control of machine tool, bakery machines, galvanic devices, machines for tire production, cleaning machines, car-wash plant, forest industry machines etc.

- Angle-, way-, counter controls and externally synchronized sequential logic controls using the external clock input, e.g. coiling machines, cutting machines, manufacturing machines, packaging machines etc.

- any combinations of these applications.

EPR48S - the intelligent one-device-solution for your control problem.



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Program. Sequential Logic Controller EPR48S

Installation
Operation voltage: AC 230V/115V
Mains frequency AC: 50-60Hz
Power consumption: approx. 20VA
Temperature range: 0° - 40°C
Protection: IP54 front
Weight: approx. 3000g
Fitting position: as desired

Outputs
48 transistor outputs, DC 10-60V, 100mA
Plus-switching
Electrically isolated by optocoupler
2 european standard size pc boards with 24 outputs each
Front LED-display
Rear 37-pole Sub-D plug-in connection

Inputs
8 inputs, enable step, logical combination
1 reset input
1 clock input, max. 5000Hz
each DC 10-30V, electrically isolated

Auxiliary Power Supply Output
DC 12V, 250mA stabilized
Electrically isolated

Program Alternation Input
6 bit binary, 1 transfer signal
DC 10-30V electrically isolated

Serial Interface
V24, RS232-level
300-9600 Baud,8 Bit, even parity

Processor System
16-Bit-CMOS processor system
16MHz system cycle, 32MHz clock
64KB EPROM, 192KB RAM
Battery-buffered, with retentive memory

Display
12-digit LED-dot matrix red, all ASCII-characters, special characters
Height of symbols 5.08mm,
3 adjustable brightness levels

Keys
Integrated foil-coated keys with pressure point, 9 keys, IP65

Programming
Integrated programming unit, clear text-dialogue entry via keys or personal computer,
Optional release by external key-operated switch
Input functions for:
- New input, alterations, documentation of output-switching areas
- New input, alterations, documentation of input combination
- Deleting output-switching areas
- Deleting whole program
- Program selection
- Number of steps
- Program jumps
- Time of step
- Time unit
- Program (segment) copying
- In-operation correction
- Installation
- Conversion factor
- Communication via serial interface

Self-Monitoring
Watch-Dog with control-output, memory-check
Transfer-check serial interface

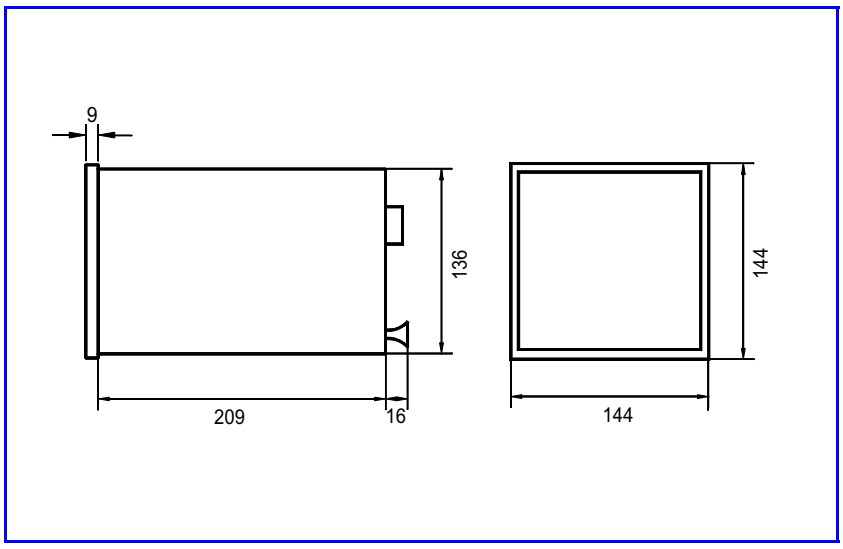
Mechanical Construction
Sturdy plastic case in accordance with DIN 144x144mm
Front: foil-coated keys on aluminium supported-place
Printed circuit boards in European format replaceable on rear side without disassembly of case
All electrical connections on rear side plug connectors
Mains and key-operated switch on screw terminals connection

Accessories

EPRPRO for WINDOWS:
PC-software for programming
data transfer
text editing, documentation

Cable for serial interface 2m,
2x Sub-D-plug-in connection 25-pol.
Order-No. 585732

Cable for serial interface 2m,
1x Sub-D-plug-in connection 25-pol.
1x Sub-D-plug-in connection 9-pol.
Order-No. 585733



Order-Nr	Type
585800	EPR48S AC230V, 48 Outputs
585801	EPR48S AC115V, 48 Outputs
585802	EPR48S/2 AC230V, 24 Outputs
585803	EPR48S/2 AC115V, 24 Outputs
585716	EPRPRO für Windows 9x,NT, XP

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The EPR16S combines the technical advantages of a programmable logic controller (PLC) with a maximum of operator convenience. Program unit, operator guidance and controller are integrated in one device. Thanks to clear text-conversation programming is very simple and can be learnt in a very short time. 9 keys without complicated double-functions are sufficient, even for complex program inputs.

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- *Any program jumps*
- *By using the internal time base, each step time between 1 ms and 99.9 min is possible*
- *16 outputs, 8 inputs, input for external clock– and reset input*
- *Changing clear text display during operation, e.g. for displaying steps or speed*
- *Serial interface for data transfer to PC/PLC*
- *Output of the running process data, e.g. machine position or speed via the serial interface*
- *Programmable with EPRPRO for WINDOWS via PC*

5

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- Angle-, way-, counter controls and externally synchronized sequential logic controls using the external clock input, e.g. coiling machines, cutting machines, manufacturing machines, packaging machines etc.

- any combinations of these applications.

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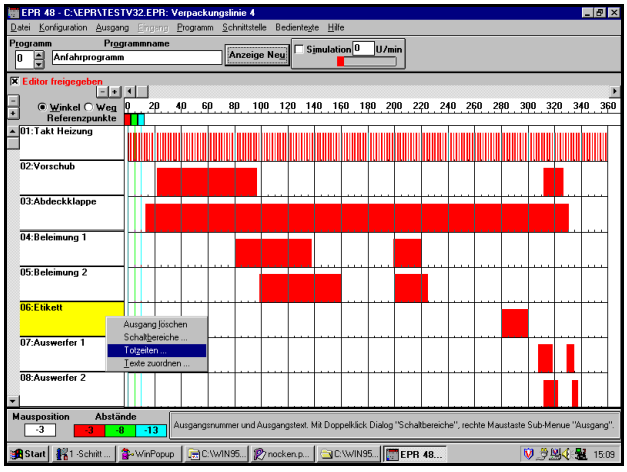

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The PC-Software for all EPR/EPC-devices.

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Program. Sequential Logic Controller EPR16S

Installation

Operation voltage: AC 230V/115V
DC24V +/- 10%
Mains frequency AC: 50-60Hz
Power consumption: approx. 14VA
Temperature range: 0° - 40°C
Protection: IP54 front
Weight: approx. 1300g
Fitting position: as desired

Outputs

16 transistor outputs, DC 10-60V, 100mA
Plus-switching
Electrically isolated by optocoupler
Rear 37-pole Sub-D plug-in connection

Inputs

8 inputs, enable step, logical combination
1 reset input
1 clock input, max. 2000Hz
each DC 10-30V, electrically isolated

Incremental Encoder Input

Electrically isolated by optocoupler
clock input ,2 lines, right/left direction of rotation
max. 2000Hz
0-position input (reset)

Auxiliary Power Supply Output

DC 12V, 250mA stabilized
Electrically isolated

Serial Interface

V24, RS232-level
300-9600 Baud,8 Bit, even parity

Processor System

16-Bit-CMOS processor system
8MHz system cycle, 16MHz clock
32KB EPROM, 128KB RAM
Battery-buffered, with retentive memory

Display

12-digit LED-dot matrix red, all ASCII-characters, special characters
Height of symbols 5.08mm,
3 adjustable brightness levels

Keys

Integrated foil-coated keys with pressure point, 9 keys, IP65

Programming

Integrated programming unit, clear text-dialogue entry via keys or personal computer,
Optional release by external key-operated switch
Input functions for:
- New input, alterations, documentation of output-switching areas
- New input, alterations, documentation of input combination
- Deleting output-switching areas
- Deleting whole program
- Program selection
- Number of steps
- Program jumps
- Time of step
- Time unit
- Program (segment) copying
- In-operation correction
- Installation
- Conversion factor
- Communication via serial interface

Self-Monitoring

Watch-Dog with control-output, memory-check
Transfer-check serial interface

Mechanical Construction

Sturdy plastic case in accordance with DIN 144x144mm
Front: foil-coated keys on aluminium supported-place
All electrical connections on rear side with plug connectors
Mains and key-operated switch on screw terminals connection

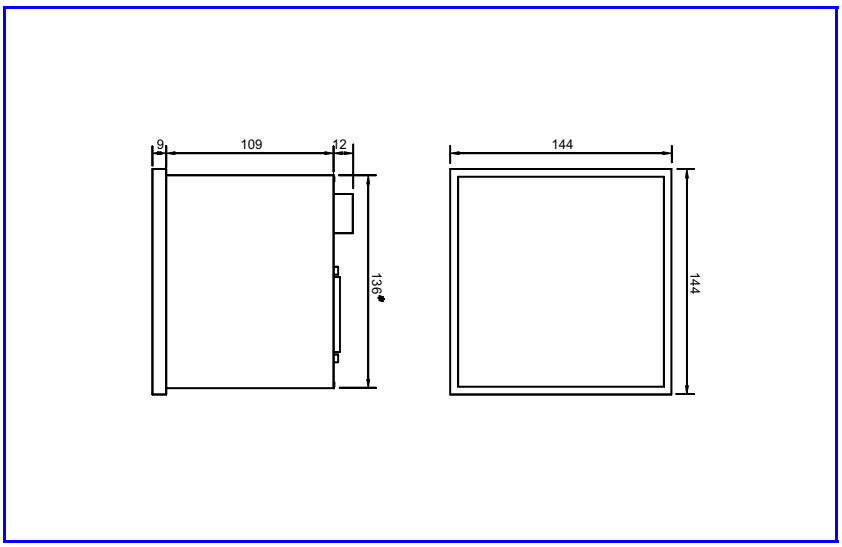
Accessories

EPRPRO for WINDOWS:
PC-software for programming
data transfer
text editing, documentation

Cable for serial interface 2m,
2x Sub-D-plug-in connection 25-pol.
Order-No. 585732

Cable for serial interface 2m,
1x Sub-D-plug-in connection 25-pol.
1x Sub-D-plug-in connection 9-pol.
Order-No. 585733

Order-No	Type
585420	EPR16S AC 230V
585421	EPR16S AC 115V
585422	EPR16S DC 24V
585450	EPR16-RE Relay-output-card
585455	EPR16-OK Optocoupler-output-card
585881	EPRS user manual german



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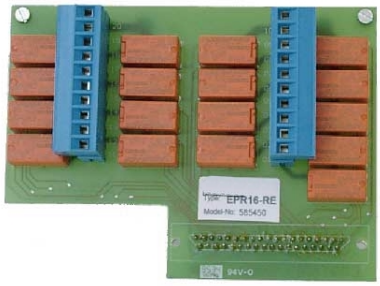
Relay-Output Card EPR16-RE

The output card **EPR16-RE** possesses 16 digital relay outputs for the devices EPR16, EPC16 and EPR16S. The Watch Dog output is available as relay contact too. All relay contacts are protection-wired with 250V-varistors.

There are two contact blocks with a common connection in each for output 1..8 with Watch Dog as well as for output 9..16. Both blocks are electrically isolated and can be operated therefore with different voltages.



Power Transistor Output Card EPR16-OK

The output card **EPR16-OK** possesses 16 electronic outputs for the devices EPR16, EPC16 and EPR16S. The Watch Dog output is available as 0.5A-transistor output. All outputs are electrically isolated, durable short-circuit proof and temperature rise-protected. There are one or two contact blocks with a common connection in each for output 1..8 with Watch Dog as well as for output 9..16.

Everyone of the short circuit proof transistor switching outputs switches a maximum permanent current of 0.5A. In the short-circuit or case of temperature rise the output is switched off. Restarting is effected automatically after falling below that overload. At the ports +U and 0V an external DC voltage 10-30V is necessary. The load is connected between output (A1..A16) and 0V.

5

Assembly

The card is mounted simply on the OUTPUT plug-connection of the EPR16/EPC16/EPR16S and fixed with the enclosed screws. The voltage supply of the relays is available from the EPR / EPC. Attached inductances such as single solenoid valves, small contactor etc. must be protection-wired (RC element or varistor).

Specifications

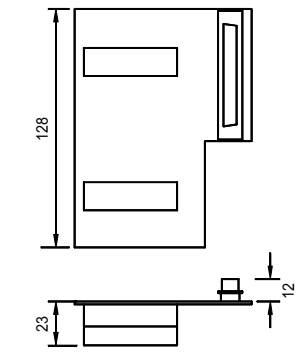
Outputs: 16 N/O contacts
Watch Dog output: 1 N/O contact
Temperature range: 0° to +60°C

EPR16-RE:
2 contact blocks each with a common connection
Contact rating: 3A, AC 250V; 3A, DC 24V
max. sum current for each block: 8A
Insulation voltage coil/contact: 2.5kV

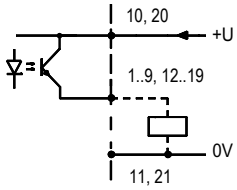
EPR16-OK:
16 transistor outputs
Watch Dog output: 1 transistor output
2 contact blocks each with a common connection
Contact rating: 0.5A; DC 10-30V; smoothed,
Residual ripple < 5%
durable short-circuit proof
Temperature rise disconnection

Terminal	EPR16-RE	EPR16-OK
01	Watch-Dog	Watch-Dog
02	Output 1	Output 1
03	Output 2	Output 2
04	Output 3	Output 3
05	Output 4	Output 4
06	Output 5	Output 5
07	Output 6	Output 6
08	Output 7	Output 7
09	Output 8	Output 8
10	Comm. Conn. 1..8	+U (Input)
11	Output 9	0V (to +U)
12	Output 10	Output 9
13	Output 11	Output 10
14	Output 12	Output 11
15	Output 13	Output 12
16	Output 14	Output 13
17	Output 15	Output 14
18	Output 16	Output 15
19	Comm. Conn. 9..16	Output 16
20	Comm. Conn. 9..16	+U (Input)
21		0V (to +U)

The signals +U and 0V of both connecting terminals are internally connected.



Additional installation depth 36mm



Transistoroutputs EPR16-OK

Order-No	Type
585450	EPR16-RE for EPR16(S), EPC16
585455	EPR16-OK for EPR16(S)

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Absolute Shaft Encoder EPR-WG

The EPR-WG is a robust absolute shaft encoder for heavy duty applications in connection with our programmable cam-controllers EPR/EPC.

- *Resolution of 360 steps / revolution, others on request*
- *Binary or Gray-Excess-76-Code*
- *PNP/NPN transistor outputs*
- *Outputs absolutely short circuit proof*
- *Direct connection to EPR16, EPR48, EPC16, EPC48*
- *Counting direction over up/down-input reversibly*
- *Mechanical robust*

5

An absolute numerical value is assigned to each angle in the Binary- or Gray-code. A point of reference as with incremental shaft encoder is not necessary therefore.

The code disc is scanned opto-electronically wear-free. All output signals are absolutely short circuit proof. The transistor outputs of the individual channels permit a switching to the load to supply voltage or to 0V.

Due to ball bearings and the durable mechanical structure the shaft encoder is suitable also for high numbers of revolutions.

The shaft encoders are available with axial or radial plug-in connection. Suitable cable connections and clutches are likewise available.

Pin assignment EPR-WG2 / EPR-WG3

Pin 12pol EPR-WG	Pin 25pol EPR	Signal	cable colour
1	1,14	0V	blue
2	2	2^0 / G^0	brown
3	15	2^1 / G^1	green
4	3	2^2 / G^2	black
5	16	2^3 / G^3	grey
6	4	2^4 / G^4	white
7	17	2^5 / G^5	rose
8	13,25	+10..24V	red
9	5	2^6 / G^6	violet
10	18	2^7 / G^7	red/blue
11	6	2^8 / G^8	yellow
12	10	up/down	grey/rose
	case	PE	

The cable color refers to the cables supplied by us. PE is grounded on one side.

Order-No	Type
585480	EPR-WG2 360/U Gray-Excess.-76-Code, axial
585482	EPR-WG3 360/U Binary code, plug axial
585471	EPR-WG4 360/U Binary code, plug radial
585489	Connection plug EPR-WG/EPS-WG
585494	Cable 3m EPR-WG2/3/4 with plug
585495	Cable 10m EPR-WG2/3/4 w with plug
585496	Cable 5m EPR-WG2/3/4 with plug
585498	each additional meter cable
585470	Coupling WGK, length 32mm

Specifications	
Supply voltage	DC 10-30V
Power consumption without load	120mA
Outputs	20mA, short circuit proof
Vibration	100m/s² (100Hz sinusoidally)
Permissible number of revolutions	6000 r.p.m
Permissible acceleration	2000m/s²
Protection	IP65
Connection	Plug connector IP54
Temperature range	0 - 55°C
Weight	approx. 300g

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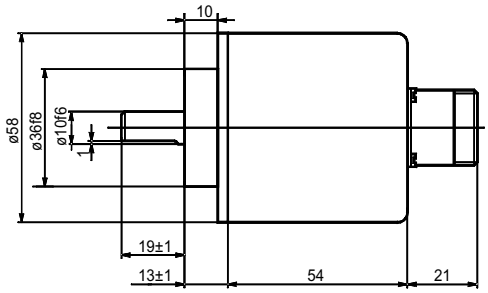
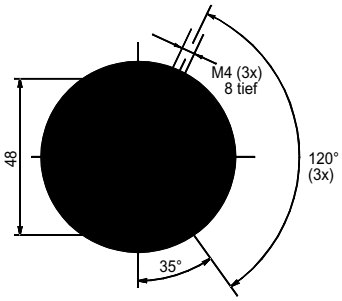
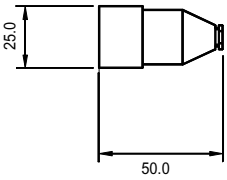


EPR-WG2 / EPR-WG3
EPR-WG4 as EPR-WG3 but plug radial





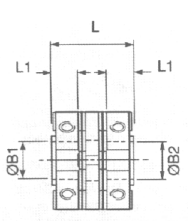
Connection plug

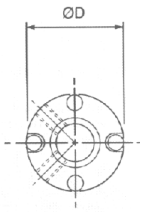
Flexible coupling WGK

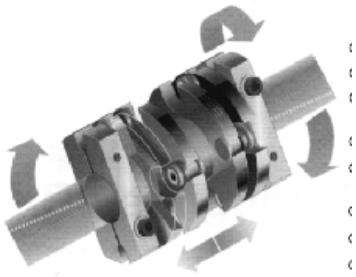
High precision coupling with almost unlimited life expectancy and outstanding kinematic characteristics. They protect the shaft encoders reliably from unwanted radial – and axial shocks/vibrations.

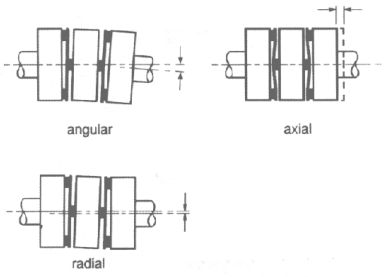
WGK can be used up to 25000 r.p.m. and outlasts an almost unlimited number of misalignment load cycles.

Specifications	
Dimension	L = 32,1mm, L1 = 10,0mm
Drillings	B1/B2 = 10mm
Mass-moment of inertia	80kgm² x10⁻⁷
Impact moment	5,6Nm
Max. wave misalignment	angular +/-3°;
	radially +/- 0,2mm;
	axially +/- 0,2mm
Weight	52g









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Incremental Shaft Encoder EPS-WG

The EPS-WG is an incremental shaft encoder in mechanical durable quality, particularly suitable in connection with our programmable electronic sequential logic controller EPRS.

- *Push-pull outputs*
- *outputs absolutely short circuit proof and protected against wrong polarity*
- *direct connection at EPR16S, EPR48S*
- *2 clock signals, 1 zero signal*
- *mechanical very solid*

Two 90° phase-shifted clock signals are available as output signals as well as a zero signal. The direction of rotation is recognized by the phaseshifted clock signals, the zero signal serves as the point of reference, which synchronizes the controller after each full revolution with the shaft encoder. As a standard the shaft encoder is delivered with 180 pulses/ revolution.

Due to the pulse doubling in our programmable electronic sequential logic controllers a resolution of 1° can be achieved. Other pulse numbers are available on request.

The code disc is scanned opto-electronically, contactlessly and wear-free. All output signals are absolutely short circuit proof and protected against wrong polarity. Each connection can be put to each potential of supply voltage, without to destroy a component. The push-pull output stage of the individual channels permits a switching of the load to the supply voltage or to 0V.

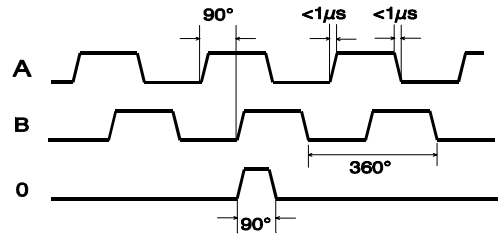
Due to the ball bearing shaft and durable mechanical structure the shaft encoder is suitable even for high revolutionspeed.

Suitable connecting cables or couplings are also available.

Pin assignment EPS-WG2

Pin 12pol EPS-WG	Pin 25pol EPRS	Signal	Cable colour
3	15	Zero (0)	white
5	2	Tact1 (A)	yellow
8	20	Tact2 (B)	rose
10	1,14	0V	blue
12	13,25	+10..30V	red
	case	PE	

The cable color refers to the cables supplied by us. PE is grounded on one side.



Pulse diagram

Specifications	
Supply voltage	DC 10-30V
Power consumption without load	120mA
Outputs	20mA, short circuit proof
Pulse frequency	max. 20 kHz
Vibration	100m/s² (100Hz sinusoidal)
Permissible number of revolutions	6000 r.p.m
Permissible acceleration	2000m/s²
Protection	IP65
Connection	Plug connector IP54
Temperature range	0 - 55°C
Weight	approx. 300g

Order-No	Type
585490	EPS-WG2 180 pulses/revolution, 360 or 500 on request
585497	Cable 5m EPS-WG2 with plug
585498	Each additional meter cable
585470	Coupling WGK, length 32mm

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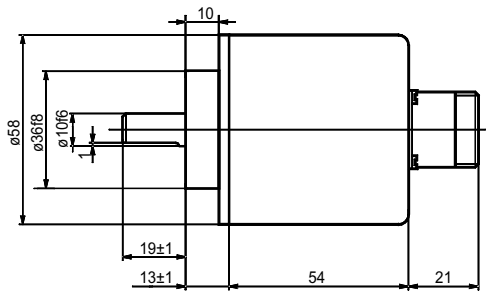
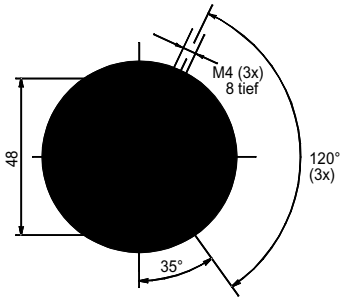
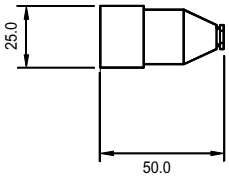


EPS-WG2 (plug axial)





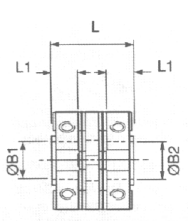
Connection plug

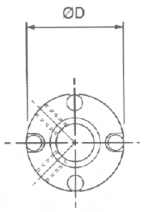
Flexible coupling WGK

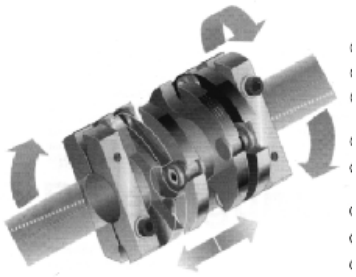
High precision coupling with almost unlimited life expectancy and outstanding kinematic characteristics. They protect the shaft encoders reliably rom unwanted radial – and axial shocks/vibrations.

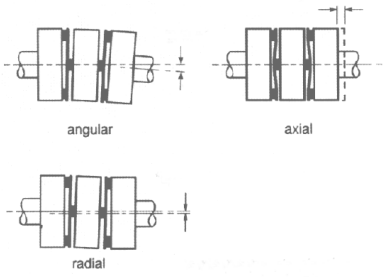
WGK can be used up to 25000 r.p.m. and outlasts an almost unlimited number of misalignment load cycles.

Specifications	
Dimension	L = 32,1mm, L1 = 10,0mm
Drillings	B1/B2 = 10mm
Mass-moment of inertia	80kgm^2 x10^{-7}
Impact moment	5,6Nm
Max. wave misalignment	angular +/-3^0;
	radially +/- 0,2mm;
	axially +/- 0,2mm
Weight	52g









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***EX16* is the high speed, cost-effective alternative solution to a conventional microprocessor controlled PLC. A program is not converted into machine code, but into firmly wired logic. Regardless of how complex the application is, the reaction times between the input and the output signals always remain constant, as no cycle times come about.**

- ***High speed - without cycle time***
- *16 digital inputs / 16 digital outputs*
- *Relay or transistor outputs (EX16T)*
- *4 programmable timers, adjustable by potentiometers*
- *Optionally analog input / analog output*
- *Integrated programming interface*
- *Programming to IEC 1131-3 under WINDOWS™*
- *High interference-protection cause of the mains filter and overvoltage protection*
- *Easiest programming without programming device*
- *Absolutely power fail safe*
- *Plug-in terminals*

5

EX16 - the High-Speed PLC

16 inputs, 16 outputs and 4 timers permit various possibilities of use, e.g. gate and barrier controls with lights, complete sequence controls, controlling of automatic production machines, substitute of program- or step-by-step switching devices, monitoring and fault-detection systems, control of packaging or gluing units...

As an option, the **EX16** possesses an analog/digital and digital/analog transformer, as a result of which the spectrum of uses is extended by applications such as temperature or pressure monitoring, speed controls ...

All the important functions are implemented by the **EX16** with the help of a single FPGA IC (Field Programmable Gate Array). This results in high speed, maximum reliability and a price/performance ratio unparalleled up to now.

Functions

Amongst the time functions, any logical connective between inputs and outputs is programmable. With the help of internal registers, signals and linking results can be stored intermediately (markers).

The time ranges can be set even after programming by DIL switches. The times can be infinitely regulated within the time range set by potentiometers, even in ongoing processes.

Programming

The programming is done either by MEYLE or by the customer with the help of a programming cable which can be connected to the parallel interface of a PC. The production of the software is done with the EX_PRESS programming system, which runs under WINDOWS™ and represents a sub-quantity of the PLC programming language "Structured Text". EX_PRESS defines itself from IEC1131-3. The program loaded from the PC into the EX16 is absolutely no-voltage safe without batteries and can be electrically deleted or re-programmed more than 1000 times.

Mechanical set-up

EX16 can be snapped onto a DIN-rail 35mm. The wiring is done via plug-in screw terminals. 16 green and 16 red LED's give information about the logical state of the inputs and outputs. The potentiometers, just like the programming plugs, are accessible from above, even after installation.

Customers specified arrangement

Regarding to your conceptual formulation, in mass production we also fit the hardware. This does not only apply to extensions but also to the renunciation of parts which are not required. So you always get an optimized price-performance-relation.

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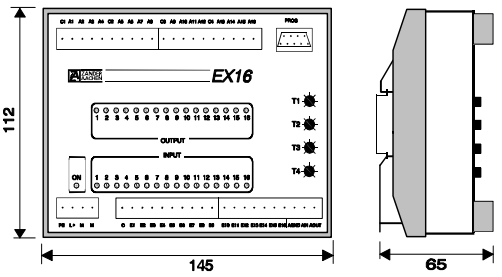
Installation

The PLC EX16 needs an unstabilized, smoothed direct voltage supply of DC 24V. Mains filter and over-voltage protection are integrated. The grounding wire must be applied to the connector PE. Because of a higher noise immunity each input is equipped with a signal delay of approx. 1ms (EX16) or approx. 0.1ms (EX16T). As an option the relay-outputs are available with varistor protected connection (EX16V). On the side of the device, there are DIL switches for determining certain operating parameters, such as the basic time ranges.

Specifications	
Operating voltage	DC 24V, +/-20%
Residual ripple	max. 5%
Current consumption	approx.. 50mA plus 10mA per activated output
Inputs	each DC 18-30V, also as clock inputs
Outputs:	16 relays or transistors, each 1N/O
Timer	4 integrated programmable timer
Time base	0.1-640s adjustable via potentiometer, via software, also other time bases available
Available internal flags	44 Bit-register add. 1 register per output
Capacity of logical combinations	approx. 5000 AND / 300 OR
LED	each input / output, RUN
Time delay input/output	approx. 100µs
Max. input frequency	ca. 10kHz each input
Temperature range	0 -+50^0 C
Weight	approx. 550g
EX16, EX16V (16x relays outputs) switching capacity	AC 250V 5A, DC 24V 3A, ohmic load max. sum current of each group: 8A per 4 outputs 1 common connector external fuse required *EX16V* with additional varistor protected connection 250V
EX16T (16x transistor outputs) switching capacity	DC 10..30V; 0,5A short circuit proof
Analog input/output (option)	1 analog input und 1 analog output each 8 Bit, 0..10V, input also 4..20mA time delay input: 10µs time delay output: 200µs (without multiplexing of inputs)



Conn. Assignment

Connection	Signal
L+	+DC 24V supply
M	0V supply
PE	PE connector
E1..E16	inputs 1..16
C	0V inputs
AIN	analogue input 0..10V or 0..20mA
AOUT	analogue output 0..10V
AGND	0V analogue input/output
EX16: 16 relay outputs	
A1..A16	outputs 1..16
C1	common conn. A1..A4
C2	common conn. A5..A8
C3	common conn. A9..A12
C4	common conn. A13..A16
EX16T: 16 transistor outputs	
A1..A16	outputs 1..16
U+	10..30V, positive voltage of the outputs
U-	0V potential of the output transistors

Setting of the DIL switches

Time range T1	Switches 3	4	Time range T2..T4	Switches 3	4
0,1..250ms	on	off	0,1..2,5s	on	off
0.03..1s	off	on	0,3..10s	off	on
0.2..8s	off	off	2..80s	off	off
2..64s	on	on	16.640s	on	on

Timer Control T1..T4

Switch 1: off - timer runs after switching EX16 on
on - start/stop of the timers by A13 .. A16
Switch 2: o ff - timer runs for one cycle
on - timer runs continuously

CTRL-SW (Control-Switch)

1: off - A/D transformer inactive; on - A/D transformer active
2: off - AIN 0..10 V; on - AIN 0..20 mA
3: off, 4: off - D/A transformer inactive
3: on, 4: off - D/A transformer permanently active
3: off, 4: on - multiplexing D/A transformer and A1..A8, controlled by A11

Attention!
3 and 4 must not be "on" at the same time!
5,6: position can be inquired by the program.
Set 5 and 6 to "off" during programming.

Order-No	Type
588202	EX16, relay outputs
588210	EX16V, relay outputs with varistors
588215	EX16T, transistor outputs
588220	Analogue-Input/Output EX16V,EX16T (Option)
588290	EX_PRESS for WINDOWS 9x,NT,XP Software with programming cable

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SPEEDY is the micro-PLC for maximum performance in minimum dimensions. The heart of the control is not a micro-controller, rather an FPGA-chip. This means that SPEEDY runs your program internally, absolutely parallel and in real-time – with no cycle times. Further advantages: no system crashes through software errors because your program is not saved as code but is "wired" in the FPGA-chip according to the desired function.

- ***High-speed – no cycle times***
- *9 digital inputs*
- *8 digital relay outputs*
- *1 cycle input, optionally also as digital input*
- *2 potentiometers for adjustable time functions*
- *3 compact device variants*
- *High interference protection, mains filter, overvoltage protection*
- *Simple programming without programming devices*
- *Absolutely power fail safe*
- *Modular extension facility*
- *Plug-in terminals*

5

The basic version of *SPEEDY* has 9 digital inputs, which can optionally be used as counter inputs and 8 digital outputs, power relay or power transistor outputs. Two integrated potentiometers allow time adjustments during use. SPEEDY also has an expansion socket as a standard feature. Extension modules can be connected to this with no problems. And if this is still not enough, we can adapt *SPEEDY* to your individual application.

Functions

Apart from time and counter functions, random logic operations between inputs and outputs can be programmed.

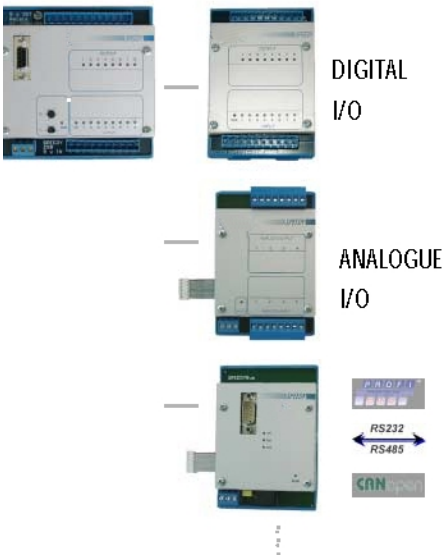
Since the control works in parallel without internal cycle times the outputs react to changes in the input signals **without** delay, apart from the switching times of the relays and transistors.

Two externally accessible potentiometers enable a continuous time adjustment even during running processes. Four time domains cover a range from 10ms to 10min. Further division factors can be programmed with the software. If the potentiometers are set fully to the left you have an internal calibrated time base of 10ms.

The cycle input CK can also optionally be used as a logical digital input. The other digital inputs can also process fast timing signals.

Programming

SPEEDY can be easily programmed with our PC program ***EX_PRESS*** for Windows. Connect the integrated programming socket to the printer port of your PC or notebook, start our PC program EX_PRESS and away you go. No programming devices are needed. Formulate your problems comfortably and quickly, from simple logical instruction lists through to ***structured text according to IEC 1131***. Then load the program from the PC to the control – that's all there is to it. Naturally, you can also delete loaded programs from your PC. And it doesn't matter how and in which sequence you have written your programs, everything runs in parallel and real-time in *SPEEDY*.



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Standard programs

Complete standard programs are available for a number of applications. Step-by-step switching devices, gate control, compressor control, fault detection systems, gluing control, automatic filling machines... *SPEEDY* can be used easily and universally.

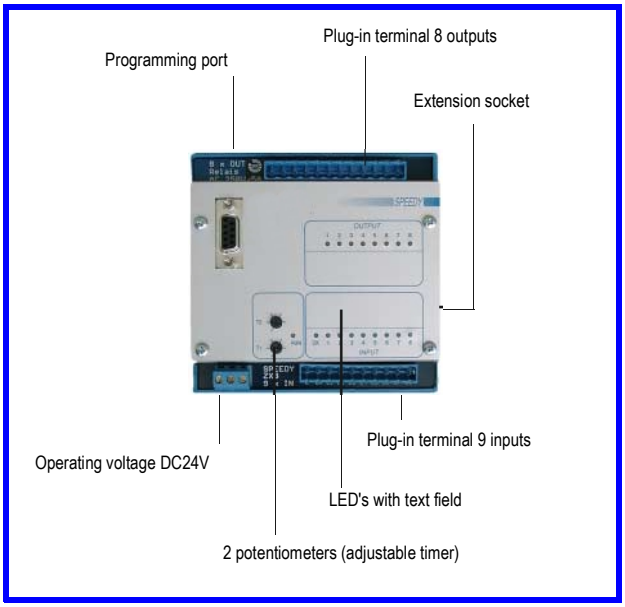
Installation

SPEEDY can be clipped onto 35mm DIN rails. The control requires an unstabilized, smoothed DC 24V power supply. Mains filter and overvoltage protection are integrated. The grounded earth should be connected to the PE terminal for shielding. Our NTX power supply unit is used as a low-cost compact, power pack for connection to AC 230V/115 V. Connection is via a plug-in screw terminal.

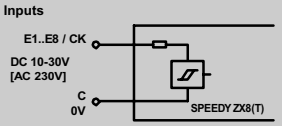
Each input is switched on the hardware side with a signal delay of approx. 1ms to ensure a high interference protection.

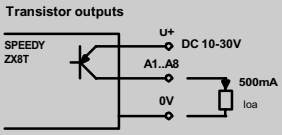
Extension modules

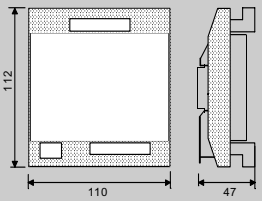
SPEEDY has an expansion socket as a standard feature. Extension modules can be connected to this, e.g. 8 additional I/O's, analogue I/O's, external timer module, text display as well as a bus connection module. Please refer to the separate data sheets.

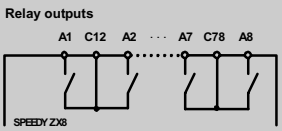


Conn.	Signal
L+	DC 24V power supply
M	0V power supply
PE	Protective earth
E1..E8	Inputs 1..8
CK	Clock input or input 9
C	0V inputs, cycle
A1..A8	Outputs 1..8









Specifications	
Operating voltage	DC 24V, +/-20%
Residual ripple	max. 5%
Current consumption	approx.. 50mA plus 10mA per activated output
Inputs	each DC 18-30V, also as clock inputs
Outputs:	8 relays or transistors, each 1N/O
Clock Input	DC 10-30V, also as digital input
Timer	2 integrated programmable timer
Time base	10ms fixed, 0.01-2.5s; 0.3-10s ; 2-80s; 0.3-10min variable setting via front potentiometers, other times also possible through software
Available internal flags	44 Bit-register add. 1 register per output
Capacity of logical combinations	approx. 5000 AND / 300 OR
Time Delay Input/Output	approx. 100µs
Max. input frequency	ca. 10kHz each input
Temperature range	0 -+50^0 C
Weight	approx. 300g
SPEEDY ZX8/ZX8V (8 relay outputs) Switching capacity	AC 250V 5A, DC 24V 3A, ohmic load two outputs each with common connection external fusing necessar ZX8V with additional varistor 250V at each output
SPEEDY ZX8T (8 transistor outputs) Switching capacity	DC 10..30V; 0,5A short circuit proof

Order-No	Type
588302	SPEEDY ZX8, DC 24V, 9 inputs DC 24V, 8 relay outputs
588303	SPEEDY ZX8, DC 24V, 9 inputs AC 230V, 8 relay outputs
588310	SPEEDY ZX8V, DC 24V, 9 inputs DC 24V, 8 relay outputs with varistor
588311	SPEEDY ZX8V, DC 24V, 9 inputs AC 230V, 8 relay outputs with varistor
588315	SPEEDY ZX8T, DC 24V, 9 inputs DC 24V, 8 transistor outputs
471200	NTX, power supply unit AC 230V / DC 24V, 160mA
588290	EX_PRESS for Windows9x/NT/XP Programming software with cable

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The described extension modules can be connected with the micro PLC SPEEDY via the expansion part. These are plugged to the PLC simply with a flat cable connection. The following extension modules are available:

- *Device with 8 digital inputs and 8 outputs*
- *Clock timer module with daily or weekly program*
- *Analogue input/output module*
- *bus module for the integration of a plug-in card for Profibus DP, interbus or CAN open*
- *Customized extension modules*

Clock timer module SPEEDY ZXCL

The clock timer module ZXCL is available with daily or weekly program. Time and switching times can quickly and easily be set by 4 multi-function keys. The current time, user guidance and switching status appear at the LCD display.

Installation

The clock timer module ZXCL is available with daily or weekly program. Time and switching times can quickly and easily be set by 4 multi-function keys. The current time, user guidance and switching status appear at the LCD display. A relais is integrated, so ZXCL can also work without a *connection* with SPEEDY autonomously. In this case the power supply is made by the DC 24V-terminal. If it is operated with SPEEDY no voltage supply is necessary. This is made by the cable connection as well as the transmission of the switching status of the clock timer.

The switching status of ZXCL is available at the SPEEDY expansion port EA9.

The extension module is attached to the basis device simply via the provided flat cable. For this unscrew the covers of the devices, plug in the flat cable and reassemble the covers. Pay attention to the correct fit of the toothed washers.

Connection	Signal
L+	+24VDC supply
M	0V supply
PE	protective earth
13/14	N/O contact of the clock timer

Order No	Type
588330	SPEEDY ZXCL, daily clock timer
588331	SPEEDY ZXCL, weekly clock timer

Techn. Data	
Operating voltage	DC 24V, +/-20%, max 16mA, only necessary for the operation without *SPEEDY*
Remaining ripple	max. 5%
Switching areas	20, with keyboard freely programmable Switching gap: 1s respectively 1min
Pulse time	1..99s adjustable
Temperature range	0 -+50° C
Weight	approx.150g
Dimension	112 x 40 x 47mm
Relay contact	1 N/O only to be operated with DC 24V without SPEEDY
Contact rating	AC 250V 5A, DC 24V 3A, ohm resistive load, external fuse necessary
Power reverse	4h, in case of mains failure

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This extension module provides additionally 8 *digital* inputs and 8 digital outputs to the controller SPEEDY. ZXTE provides 8 transistor outputs, ZXRE provides 8 relay outputs.

- *8 digital inputs DC24V or AC230V*
- *8 digital outputs, relay or transistor*
- *Simply to connect via flat cable*

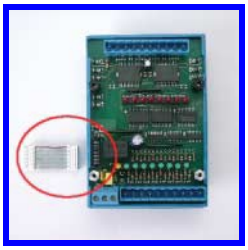
Installation

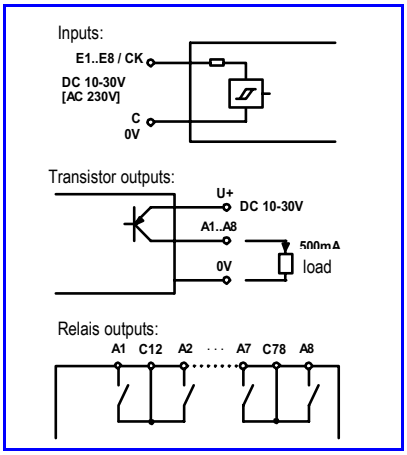
These additional inputs/outputs are addressed with the programming software EX_PRESS like inputs/outputs of the basis device, see also commentated sample program.

The extension module is connected to the basis device simply via the provided flat cable. For this unsrew the covers of the devices, plug in the flat cables and reassemble the covers. Pay attention to the correct fit of the toothed washers.

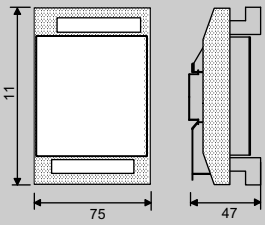
Software

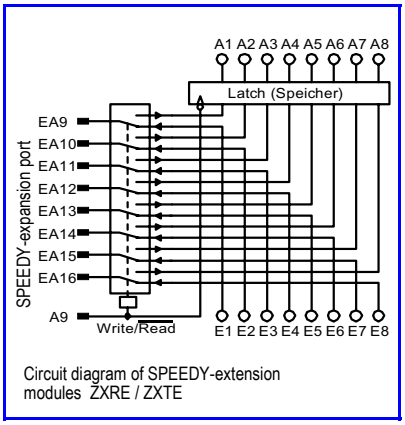
The module is directly accessed as an 8-bit input or an 8-bit output by the SPEEDY-program via the plug-in connection. If only inputs or only outputs of the extension module are used, the full SPEEDY parallel operating is performed and so the speed is the same as it is for the inputs or outputs of the basis device. If both, inputs and outputs of the extension module, are used, these will be multiplexed by the software and so the speed will be reduced.





Conn.	Signal
L+	+24VDC supply
M	0V suppy
PE	protective earth
E1..E8	input 1..8
A1..A8	output 1..8





Circuit diagram of SPEEDY-extension modules ZXRE / ZXTE

Techn. Data	
Operating voltage	DC 24V, +/-20%
Remaining ripple	max. 5%
Input current	approx. 30mA plus 10mA per active output
Inputs	8, each DC 10-30V or AC230V, also as clock inputs
Outputs	8, relay or transistors, each 1N/O
LEDs	all inputs/outputs
Temperature range	0 -+50^0 C
Weight	approx. 250g
Dimension	112 x 75 x 47mm
Contact rating ZXRE/ZXRV (8x relay outputs)	AC 250V 5A, DC 24V 3A, ohm resistive load per two outputs one common connection external fuse necessary ZXRV additionally with resistor protection circuit 250V
Contact rating ZXTE (8x transistor outputs)	DC 10..30V; 0,5A durable short-circuit proof

Order-No	Type
588340	SPEEDY ZXRE, 8x input DC24V 8x relay output
588341	SPEEDY ZXTE, 8x input DC24V 8x transistor output
588343	SPEEDY ZXRE, 8x input AC230V 8x relay output
588344	SPEEDY ZXREV 8x input DC24V 8x relay output with varistor protection
588345	SPEEDY ZXREV 8x input AC230V 8x relay output with varistor protection

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Fieldbus Extension Module SPEEDYBus

With the extension module SPEEDYBus the micro PLC SPEEDY can be attached as a Slave to an industrial fieldbus system such as ProfiBus DP, InterBus or CAN-bus as well as to the ESI-BUS. This information, which the fieldbus master sends to the SPEEDY-Bus module can be regarded for switching of SPEEDY outputs.
Or the fieldbus master can monitor or visualize SPEEDY inputs, counter values or register contents. The connection to the different fieldbus systems is made by one of the fieldbus plug-in cards B-DP, B-IS, B-CAN or V-ESI / B-ESI.

- *Connection to the SPEEDY extension port*
- *Exchangeable plug-in card for different fieldbus systems*
- *Controlling the input/output – functions via the fieldbus*
- *Program controlling via the fieldbus*

5

Installation

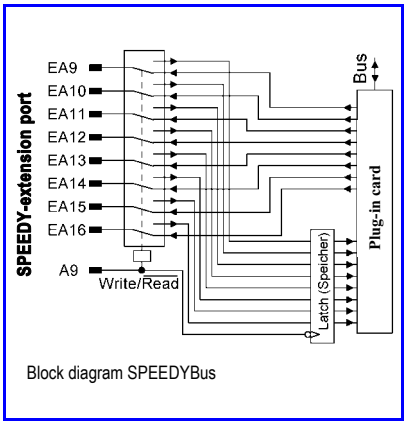
SPEEDYBus is supplied completely installed with the desired MEYLE fieldbus module. The configuration and connection to the fieldbus is made according to the instructions of the enclosed data sheet of the fieldbus plug-in card (B-DP, B-IS, B-CAN, B-ESI, V-ESI). SPEEDYBus is connected with the basis device by the flat cable. To do this the cover of the SPEEDY is unscrewed, the flat cable is plugged on the extension port, until it snaps in noticeably and the cover is screwed on again. Pay attention to correct fitting of the toothed washer.

SPEEDYBus is supplied with a voltage of DC 10V..30V via the three pole screw connection block. The positive potential is connected with L+ and 0V with M.

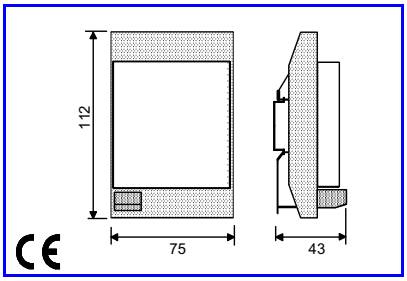
SPEEDYBus is provided with an integrated noise filter, which suppresses possible electromagnetic interferences. A low impedance connection of PE to the protective ground is necessary.

Data communication with SPEEDY

Data communication between SPEEDY and SPEEDYBus is made by the extension port. Independently of the assigned fieldbus plug-in card 8-bits words can be transferred in each direction by writing and reading of the extension port. During the writing procedure the data word is buffered in the SPEEDYBus module and can be read out from there by the fieldbus master. If SPEEDY performs a reading via the extension port, the current data word at the outputs of the fieldbus plug-in card is transferred. The data communication is made by the lines EA9 to EA16, the change-over between writing (log 1) and reading (log 0) is made by line A9. A commentated sample program (SPDYBUS.S16) is included in the programming system EX_PRESS.



Block diagram SPEEDYBus



Specifications	
Operating voltage	DC 24V, +/-20%
Residual ripple	max. 5%
Fieldbus connection	alternatively ProfiBus DP, RS232/V24, RS485, CANopen, InterBus, for more information see separate data sheets B-DP, B-IS, B-CAN, B-ESI, V-ESI
Temperature range	0 -+50^0 C
Weight	approx. 200g

Order-No	Type
588351	SPEEDYBus ProfiBus DP
588352	SPEEDYBus B_ESI (V24/RS232)
588353	SPEEDYBus V_ESI (RS485)
588354	SPEEDYBus CANopen
588355	SPEEDYBus InterBus

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The Speedy extension module SpeedyLog offers four 8-bit analog channels, which can be used alternatively as inputs or as outputs. Thus the spectrum of the applications realizable with SPEEDY is extended with tasks such as temperature monitoring, motor controls, pressure regulator etc..

- *Four 8-Bit-analog-channels, alternatively as inputs or outputs*
- *Inputs 0..10V or 0..20mA, outputs: 0..10V*
- *Easy connection to the SPEEDY-extension port*

Installation

The analog I/O extension module is supplied with DC 24V via the screw-connectors L+ and M. A noise filter and overvoltage protection is integrated. A low impedance connection of PE with protective ground is necessary.

The analog inputs work in a voltage range of DC 0..10V or optionally with a current of 0..20mA. They are provided with RC elements for filtering faster transients and they have an overvoltage protection. The analog outputs have a voltage of DC 0..10V each, providing a current consumption of max. 20mA per channel. The analog I/O´s are not electrically isolated.

The extension module is connected by the flat cable with the basis device. To do this the cover of the SPEEDY is unscrewed, the flat cable is plugged on the extension port, until it snaps in noticeably and the cover is screwed on again (do not forget toothed washer!).

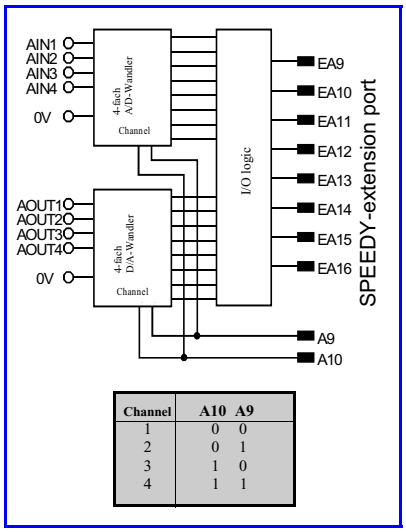
Programming

No settings or configurations are necessary for the analog I/O extension module SpeedyLog. The controlling is made completely by the programming of the basis device SPEEDY. The selection of the desired analog channel is done by the ports A9 and A10 (see schematic diagram).

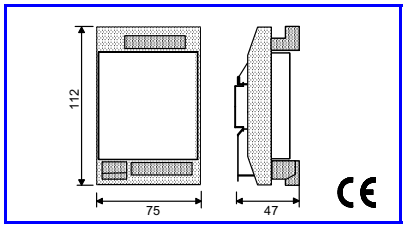
If a value shall be transferred to one of the analog outputs, this must be done by the ports EA9..EA16 (EA16 = most significant bit, MSB), and the ports must be switched to outputs (< Name>.OE: = 1). If another channel is selected, the value which has been transferred last remains stored.

Reading from an analog input takes place by switching the port lines to inputs (< Name>.OE: = 0).

Each analog channel can only be used either as input or as output, because during the reading of an input value a possibly stored output value of the same channel is lost. A sample program (SPDYLog.S16) is included in the programming system EX_PRESS.



Channel	A10	A9
1	0	0
2	0	1
3	1	0
4	1	1



Order-No	Type
588346	SPEEDYLog, Inputs 0..10V
588347	SPEEDYLog, Inputs 0..20mA

Specifications	
Operating voltage	DC 24V, +/-20%
Residual ripple	max. 5%
Inputs	4 x analog, DC 0..10V, optional: DC 0..20mA, resolution: 8 Bit, fault: <2%, transform. time: <0.2ms 0V-connections of the I/O are internally connected.
Outputs	4 x analog, DC 0..10V, max. 20mA resolution: 8 Bit, fault: <2%, transformation time: <5ms 0V-connections of the I/O are internally connected.
Digital interface	8 x I/O + 2 x I, to plug-in at the SPEEDY-extension port
Temperature range	0 -+50^0 C
Weight	approx. 200g

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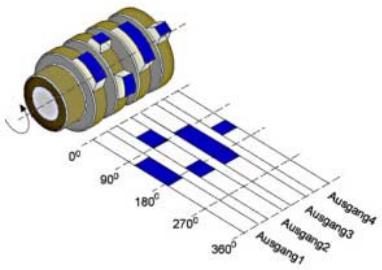
Highspeed, extremely inexpensive cam controller without cycle time

SPEEDY is suitable outstanding as programmable cam controller. At the input side an incremental or absolute encoder is attached. The desired switching areas of the outputs insert simply to the finished prepared source program "NSW-SPDY.S16" (see also documentation within the source code). At a competitionless favourable price you get such a super-fast (no cycle time!) programmable cam switching device with 8 exits. Optionally our 3-digit-display module EXD can be attached (see catalog 1/2).

SPEEDY as a high-speed cam controller provides for fast, point-exact control of packaging machines and handlingsystems.

EX_PRESS - C:\FreiFuersNetz\NSW_Spdy.s16
Datei Editieren Anzeigen SPS-Typ Compilieren Programmieren Optionen Hilfe
(* PROGRAMMIERHILFE *)
(* Gewünschten Ausdruck mit der Maus markieren, mit <Strg>+C in die *)
(* Zwischenablage kopieren, den Cursor in der gewünschten Zeile der *)
(* CASE-Anweisung positionieren und mit <Strg>+V den Ausdruck einfügen. *)
(* A1 := L; A2 := L; A3 := L; A4 := L; A5 := L; A6 := L; A7 := L; A8 := L; *)
(* A1 := H; A2 := H; A3 := H; A4 := H; A5 := H; A6 := H; A7 := H; A8 := H; *)
CASE B OF
(* H L *)
(* 256 *) 0:
(* 257 *) 1:
(* 258 *) 2: A2 := H;
(* 259 *) 3: A2 := H;
(* 260 *) 4: A2 := H;
(* 261 *) 5: A1 := L; A2 := H;
(* 262 *) 6: A1 := L; A2 := H;
(* 263 *) 7: A1 := L;
(* 264 *) 8: A1 := L;
(* Bitte diese Zeile nicht verändern! *)

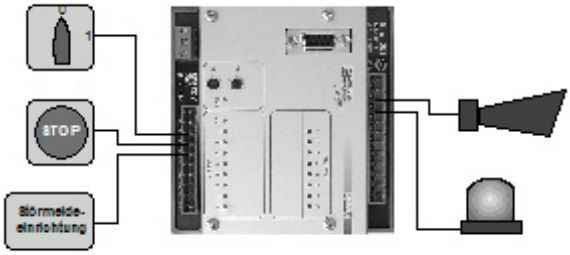


5

Fault indication system with first value message

With the program STOER.S16 a fault detection/indication system with 8 reporting inputs, first value message, 8 reporting outputs and a collecting reporting output is realized. The switching status of the reporting inputs is directly visible at the LED's. The fault indication system can be extended by adding further SPEEDY's at will. By simple software adjustment also last value message can be realized.

The program examples stated here are a free component of our software-tool EX_PRESS. The source code is commentated and thus easy to understand. A function warranty that this software under all conditions without examination works error free to the individual case, cannot be taken over. Gladly we also offer customer-specific software.



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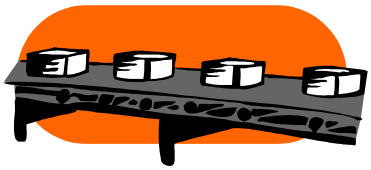
SPEEDY as program control for neon advertisement

Speedy, equipped with the program NEONSPDY.S16, realizes temporal controls to activate for example neon advertisement announcements impressively one behind the other. By wiring of the inputs, e.g. by means of cable links or selector switches simply different program sequences can be selected without intervening in the SPEEDY program. The step times are adjustable at the SPEEDY potentiometer. Of course this program can be used also as basis for other successive sequential circuits, e.g. ventilation flap secondary controls

Conveyor-belt controller

The program FBAND.S16 realizes a conveyor-belt controller for successive transportation systems. A light barrier monitoring ensures that it cannot come to material collisions at the junction points.



Barrier control

SPEEDY is fast, small and inexpensive - an optimal condition for the employment as gate – and barrier control. With the program SCHRANKE.S16 SPEEDY ZX8 changes to a gate/barrier-control with light barrier monitoring and traffic light control. With small modifications the program is also successfully in use for roll gate controls of doors in hospitals.

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With our PC program *EX_PRESS* for Windows SPEEDY *and* EX16 can be programmed very easily and comfortably.

Connect the integrated programming port with the printer port of a PC or Notebook via the programming cable.

Run the PC program ***EX_PRESS*** and start your working. Programming devices are not necessary. From simple logical instruction lists up to ***the structured text according to IEC1131*** you can formulate your assignment easily and quickly.

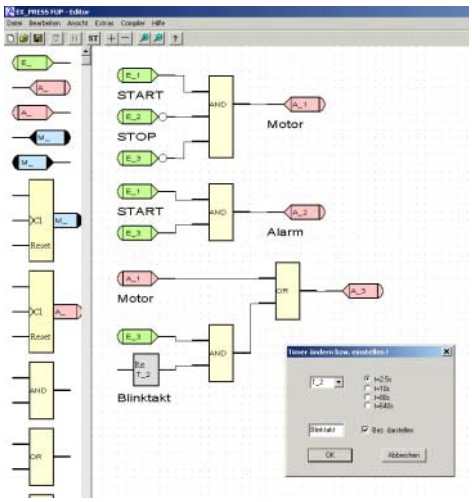
Then load the program from the PC into the SPEEDY/EX16 – ready.

Naturally you can also delete loaded programs with ***EX_PRESS.*** And independent of the fact how and in which order you formulated your program, in *SPEEDY and EX16* everything is executed parallel and in real time.

Load the free demo version from our homepage or read our introduction "So easy is EX_PRESS." You will see, within short time your first program will run.

A complete documentation is enclosed in the help system of ***EX_PRESS***.

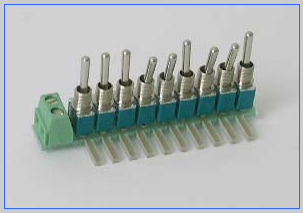
Programming with EX_PRESS – quick and easy



Order-No	Type
588290	EX_PRESS english/german Programming software with cable for Windows 9x/NT/2000/XP
588990	"So einfach ist EX_PRESS", Introduction, german
588180	Switching adapter SPEEDY ZX8
588280	Switching adapter EX16

Accessories

Switching adapters for EX16/SPEEDY – easy and fast testing of programs in the control. The switching adapter fits directly into the plugable terminal of the inputs and is connected with L+/M. The miniature switches activate the appropriate inputs.



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The compact power supply unit NTX is excellently qualified to be used as a power supply unit for small automation components, e.g. of the Micro-PLCs SPEEDY/EX16 or the fieldbus-modules ESB. The NTX is also just right as a supply unit in control applications, e.g. proximity switches, light barriers or sensors.

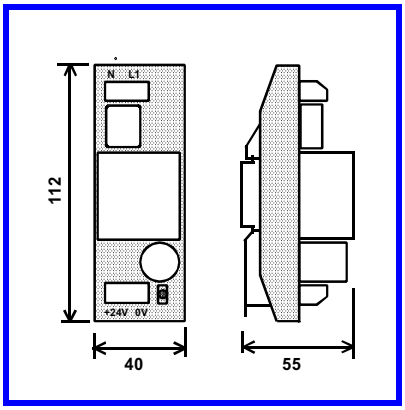
- *DC 24V / 160mA smoothed output voltage*
- *Compact size, DIN-rail mounting*
- *LED-display for secondary voltage*
- *Mains filter included*
- *Permanent short-circuit proof*

Installation

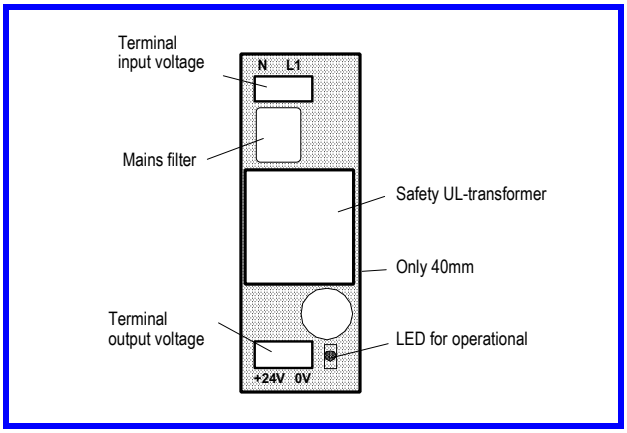
The output terminals are existing twice, so on the secondary side several **NTX** can be connected easily parallel or in series.

Because of the integrated mains filter and the short-circuit proof transformer, processor controls can operate at the **NTX** with noise immunity. The DC 24V-connection should be as short as possible and may not be placed near a high voltage transmission line or a high frequency line.

The supply unit is loadable up to 160mA (200mA peak). This is sufficient in order to supply three Micro-PLCs SPEEDY depending on the quantity of switched relay-outputs.



Order-Nr	Type
471200	NTX AC230V
471201	NTX AC110/115V



Specifications	
Operating voltage	AC 230V, 115V; +/- 10%
Mains frequency	50-60Hz
Power consumption	max. 4,0VA
LED	yellow for operational (secondary voltage)
Output voltage	DC 24V, unstabilized, smoothed
Output current	max. 160mA permanent , 200mA up to 20s
Residual ripple	< 5%
Temperature range	0 .. +50°C
Max. output voltage	DC 30V / without load / 100% input voltage
Min. output voltage	DC 17V / 160mA / 100% input voltage
Dielectric strength	4kV DIN VDE 0110-1:1997-04
Weight / mounting	approx. 280g, DIN rail mounting

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Universal Industrial Fieldbus Module ESB

The new trends in control engineering are industrial fieldbus systems such as Profibus-DP, InterBus or CAN-open. By ever faster PLC or industry PC a high arithmetic performance is centrally available, at the local machine only in- and outputs are requested for sensors and for actuators. ESB offers 8 digital inputs and 8 digital outputs. By using the plug-in card the connection to different industrial fieldbus systems and to the B-ESI-Bus can be made.

- *1 basis module for all usual fieldbus systems*
- *8 inputs and 8 outputs*
- *Alternatively transistor- or relay outputs*
- *Exchangeable plug-in card for different fieldbus systems*
- *Electrically isolated between I/O and bus*
- *LEDs for all inputs and outputs*
- *Easy installation, plug-in screw connection*
- *Compact durable housing for DIN-rail*

CANopen PROFI INTERBUS RS232 RS485

5

Structure

The **ESB** offers 8 digital optocoupler inputs, which are used with DC 10V-30V. As outputs there are 8 short circuit proof transistor outputs or alternatively 8 relay outputs available, which are electrically isolated from the remaining circuit.

The transistor outputs have a contact rating of DC 30V and 500mA, the relays of DC 30V or AC 250V and 5A.

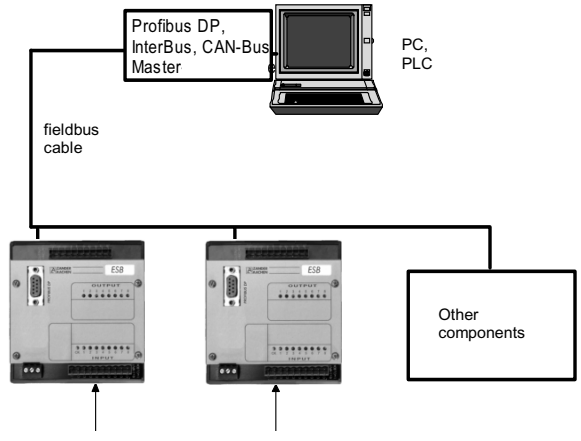
20-pin plug-in connection takes up any industrial fieldbus module:

- **B-DP** for Profibus DP or Siemens L2
- **B-IS** for Interbus
- **B-CAN** for the CAN open
- **B-ESI, V-ESI** for the simple fieldbus connectable via V24 interface.

The voltage supply **integrated** in the ESB produces from the fieldbus modules needed stabilized voltage of DC 5V and filters fast transient disturbances and surge impulses from supply voltage effectively.

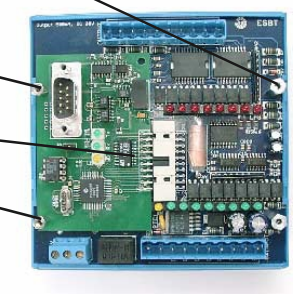
Connection allocation

Connection	Signal
L+	+24V supply
M	0V supply
PE	protective grounding
E1..E8	8 digital inputs
C	0V input
A1..A8	8 digital transistor outputs
U+	10-30V for transistor outputs
0V	0V for transistor outputs
alternatively:	
A0..A7	8 digital relay outputs
CA	comm. connection A0..A5



Installation of the industrial fieldbus plug-in card

1. Unsrew four fixing bolts of the cover
2. Unsrew two spacer pins at the card location
3. Put in the card
4. Screw in the pins again
5. Install cover



Note:
The installation of a fieldbus plug-in card may only take place on an electrostatically protected place and via ESD protected personnel.

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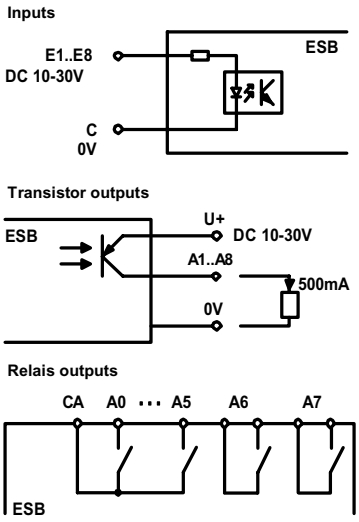
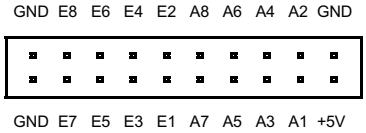
Universal Industrial Fieldbus Module ESB

Diagram Inputs / Outputs

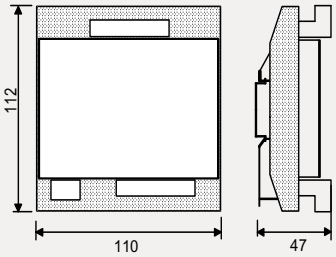


Plug-in connection

The ESB has a pin row with gilded square pins in the 2.54mm grid line dimension for the admission of a industrial fieldbus card.



Signal name of the pin:
+5V, GND: stabilized voltage for fieldbus plug-in
E1..E8: digital inputs (5V, TTL)
A1..A8: digital outputs (5V, TTL)



Specifications	
Operating voltage	DC 24V ±10%
Residual ripple	max. 10%
Power consumption	approx. 50mA plus power consumption of the used fieldbus module
Inputs	DC10-30V, max. 8,5mA
Relay outputs (ESBR)	max. AC 250V, DC 30V, 5A max. sum. current at CA: 15A
Contact life	mech. 2 x 10^7 switching operations electr. 10^5 switching operations
Transistor outputs (ESBT)	DC10-30V, 500mA, short-circuit-proof
LED-display	1 x yellow (run), 8 x green (inputs), 8 x red (outputs)
Connection terminal	each 2.5mm², plug-in connection
Temperature range	0 - +60°C
Installation position	any
Mounting	35mm DIN-rail EN 50022-35
Protection	IP20
Weight	approx. 200g

Order-No	Type
586180	Fieldbus module ESBT transistor-outputs
586185	Fieldbus module ESBR relay-outputs

Necessary accessories

The necessary plug-in card for the desired bus connection asks separately orders. See also separate product desc-

Order-No	Type
586190	Profibus DP-plug-in card B-DP
586191	InterBus-plug-in card B-IS
586192	CAN-Bus-plug-in card B-CAN
586193	ESI-RS485-plug-in card B-ESI
586194	ESI-RS232-plug-in card V-ESI

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Profibus DP Plug-in Card B-DP

B-DP is a Slave module, which can simply be integrated in a Profibus–DP or Siemens L2-fieldbus. By the provided file "ZAND0481.GSD " all important characteristics of the module are transferred to the field-bus master, that it is directly operational after the assignment of an address (address on delivery: 126).

- *Standard-conformable Profibus DP Slave*
- *Very compact module*
- *Easy installation*
- *16 I+16 O half duplex or 8 I+8 O full-duplex*
- *Data transmission rate up to 12MBit/s*

5

Stucture

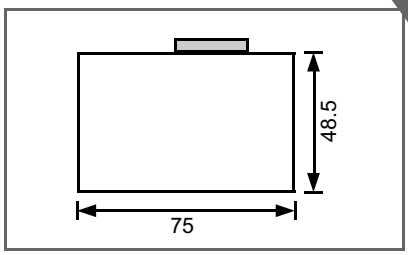
A 20-pin plug-in connection makes the connection to the application side: The module can be operated e.g. with a PLC or with an input/output module like our **MEYLE** ESB. At the plug-in connection 16 lines are available, which can be switched by 2 control lines alternatively to 16 bits half duplex mode (16 inputs and 16 outputs) or to 8 bits full-duplex operation (8 inputs and 8 outputs). The 9-pin SubD socket corresponds to the Profibus standard, besides the data lines the +5V – and 0V-Potential is available for the wiring of terminal resistances. The Profibus interface is electrically isolated from the remaining electronics.

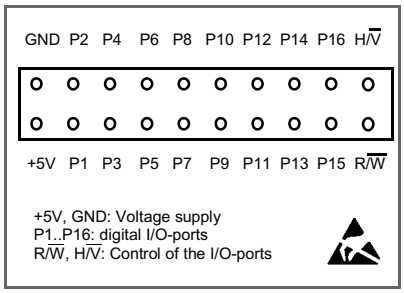
Electrical connection

The B-DP provides a plug-in connection with gold plated precision contacts, which can be plugged on pin rows with 0.635mm square pins up or round pins to 0.85mm and 2.54mm grid dimension.

Note!

The plug-in cards contain electrostatically sensitive elements. The installation may take place only on an ESD protected place and by ESD protected personnel.




GND P2 P4 P6 P8 P10 P12 P14 P16 H/V̄
+5V P1 P3 P5 P7 P9 P11 P13 P15 R/W̄
+5V, GND: Voltage supply
P1..P16: digital I/O-ports
R/W̄, H/V̄: Control of the I/O-ports

Order-No	Type
586190	Profibus DP plug-in card B-DP

R/W̄	H/V̄	E/A-Ports
1	1	P1..P16 as outputs, 16 Bit half-duplex
0	1	P1..P16 as inputs, 16 Bit half-duplex
0	0	P1..P8 as outputs, P9..P16 as inputs, 8 Bit full duplex
1	0	Not allowed

Specifications	
Operating voltage	DC 5V ±5%, stabilized
Power consumption	approx. 150mA
LED-display	run (green)
Data transmission rate	max. 12MBit/s
Profibus-DP-interface	9-pin. SubD, standard-conformable, electrically isolated Address on delivery: 126
I/O-interface	20-pin plug connection

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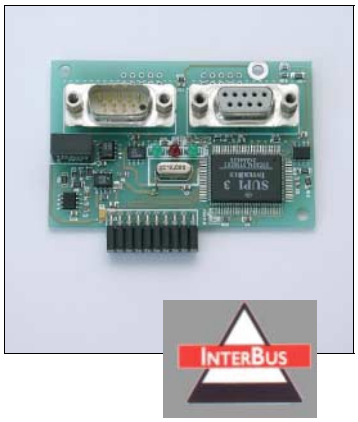
InterBus/CAN-Bus Plug-in Cards B-IS/B-CAN

The plug-in card B-IS is a Slave for the Interbus as a remote fieldbus participant. There are two 9-pin SubD connectors available, because the Interbus is wired as a ring. The I/O interface is implemented as 20-pin plug-in connector and provides 8 input and 8 output lines.

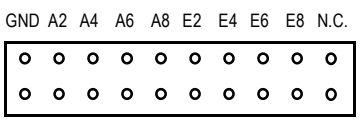


- *Standard-conformable Interbus remote fieldbus participant*
- *Very compact module*
- *Easy installation*
- *Data transmission rate: 500kBit/s*

Electrical connection

The B-IS provides a plug-in connection with gold plated precision contacts, which can be put on pin rows with 0.635mm square pins up or round pins to 0.85mm and 2.54mm grid dimension.

Order-No	Type
586191	Interbus plug-in card B-IS



Signal name of the connection:

+5V, GND: power supply
A1..A8: digital outputs
E1..E8: digital inputs
N.C.: not connected

Specifications	
Operating voltage	DC 5V ±5%, stabilized
Power consumption	approx. 150mA
LED-display	Cable check (green), Fieldbus active (green), Remote bus disabled (red)
Data transmission rate	500kBit/s
Interbus interface	2 x 9pin SubD, standard-conformable, electrically isolated
I/O-interface	20-pin plug-in connection

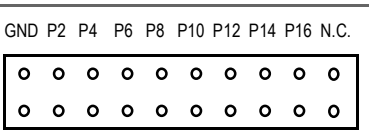
B-CAN is a remote module for the CAN fieldbus, which offers alternatively 8 inputs and 8 outputs or 12 inputs or 16 outputs at the 20-pin plug-in connection. The card corresponds to the CAN specifications 2.0A and 2.0B. With appropriate software of the master the B-CAN operates also in CANopen systems. The address in the fieldbus is adjusted via DIL switches, the I/O configuration is done via the CAN fieldbus.

- *CAN bus interface (CiA DS-102)*
- *Very compact module*
- *8 I + 8 O or 12 I or 16 O*
- *Data transmission rate up to 125kBit/s*

Electrical connection

The I/O interface is mechanically implemented similar to the B-IS (see before), however the I/O configuration is adjustable via the CAN fieldbus.

Order-No	Type
586192	CAN-Bus plug-in card B-CAN



Signal name of the connection:

+5V, GND: power supply
P1..P16: digital I/O, via CAN-Bus
configurable: P1..P8 outputs
and P9..P16 inputs or
P5..P16 inputs or P1..16 outputs
N.C.: not connected

Specifications	
Operating voltage	DC 5V ±5%, stabilized
Power Consumption	approx. 100mA
Data transmission rate	max. 125kBit/s
CAN-Bus-interface	9pin SubD, conform to CiA DS-102, electrically isolated
I/O-interface	20-pin plug-in connection

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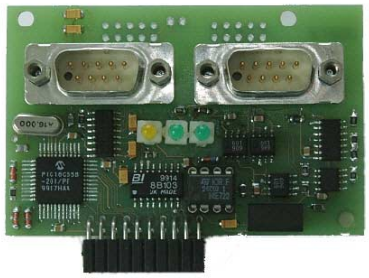
The plug-in cards V-ESI and B-ESI offer the possibility to build an inexpensive fieldbus system in simplest way over a standard-RS232-interface. Up to 32 modules can be attached to a fieldbus system, per module 8 digital inputs and 8 digital outputs are available. These are led on a plug-in connection, which is compatible to the remaining fieldbus plug-in cards (e.g. B-DP, B-IS, B-CAN). V-ESI and B-ESI thus can be put into our industrial fieldbus module ESB.



- *Efficient, simple and inexpensive fieldbus system*
- *No additional hardware at PC or PLC are necessary*
- *Simple installation, low wiring costs*
- *Simple programming, 2 protocoll variants*
- *Parameters by software via PC selectable*
- *Automatic recognition of the data transmission rate*
- *Configurable self-monitoring (Watchdog)*
- *Fieldbus length depending upon cable and data transmission rate:1000m*
- *Employment in manufacturing plants, storage systems, inspection stations, house installation etc.*

5

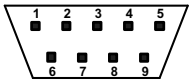
Connection to the fieldbus

If a PC or a PLC with RS232-interface is used as a fieldbus master, the first fieldbus participant must be equipped with the plug-in card V-ESI. This possesses an integrated RS232/RS485-interface, which makes the connection possible to **the following** B-ESI plug-in cards via RS485-connection. If the fieldbus master already has a RS485-interface, it can be done without the V-ESI.

For a fault-free operation the RS232-connection from the PC to the V-ESI should not be longer than 15m. The RS485-fieldbus can be used against it up to a distance of more than 1000m depending upon kind of the cable (optimum: shielded twisted pair line, as large a cross section as possible) and transmission rate .

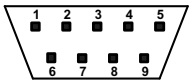
The RS232-interface is connected with the fieldbus master by a standard zero-modem cable (TxD ↔ RxD, RxD ↔ TxD, GND ↔ GND) which is available as an accessory of MEYLE. The RS485-interface connection conforms to the usual standard.

For the production of the RS485-data line the pins 3 and 7 of each fieldbus participant must be interconnected in each case. A voltage of 5V rests at the pins 6 and 5, which can be used for an external RS485-interface if necessary. It is to be considered that the RS485-fieldbus at the beginning and at the end will provide with a terminal resistance, which must be identical to the line resistance (typically: 180Ω). This is soldered between the contacts 3 and 7 of the SubD socket. Additionally at the beginning and the end of the bus, in each case two resistances of 470Ω are necessary, which are soldered between the contacts 3 and 6 and 7 and 5. (see wiring diagramm)



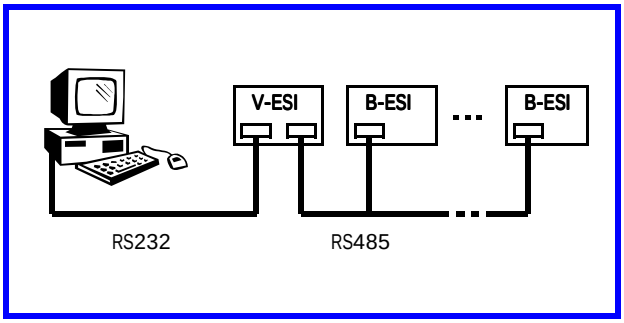
RS-232-interface (V-ESI)

2: RxD
3: TxD
5: 0V (GND1)
other pins: not connected



RS-485-interface (V-ESI, B-ESI)

3: Tx+/Rx+
7: Tx -/Rx -
6: +5V
5: 0V (GND2)
other pins: not connected



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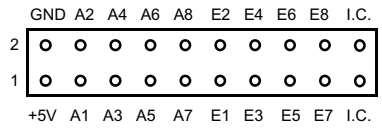
RS232/RS485 Plug-in Cards V-ESI/B-ESI

I/O-port - plug-in connection

At a 20-pin socket strip the input/output signals are available as TTL level (5V).



Signal name of the pin:

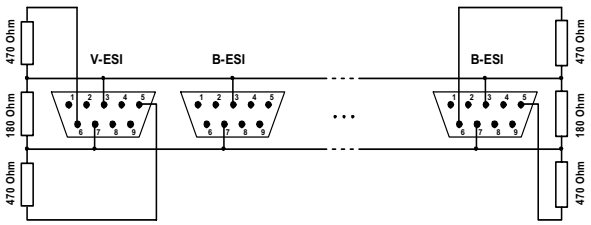
+5V, GND: power supply
A1..A8: digital outputs
E1..E8: digital inputs
I.C.: do not wire! Internally connected

Software

Download our free of charge installation software B-ESI from our homepage. It simply configures your fieldbus from the PC.

Existing Windows DLL functions make the integration of the B-ESI-fieldbus into all Windows programs possible (e.g. Visual basic, Delphi, C++..) with few lines of program code. The entire bus handling is taken over automatically by the DLL functions. Various demo programs with source code are likewise present. You find a detailled description in the assistant system of the B-ESI-software.

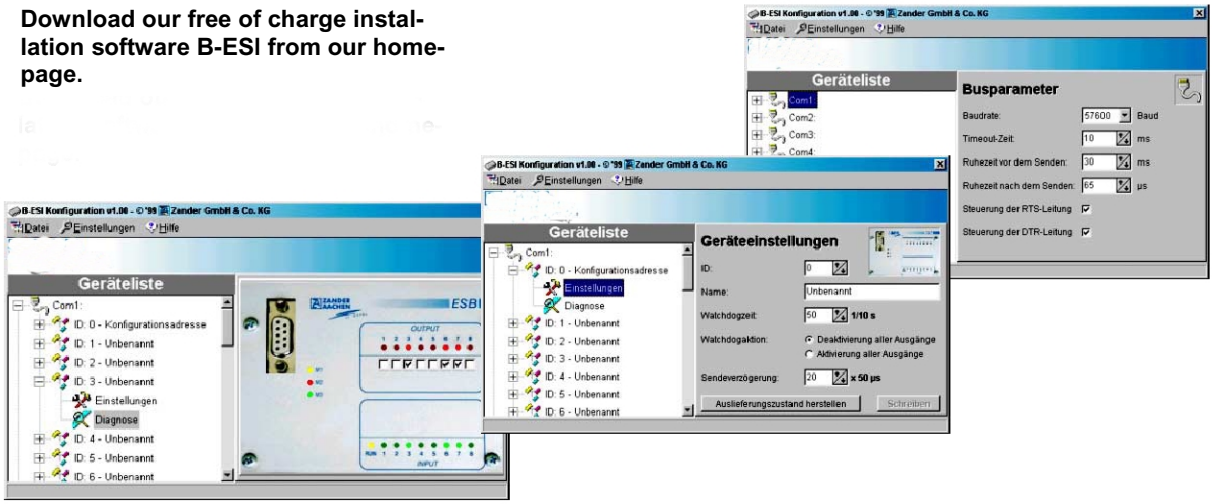
Order-No	Type
586193	B-ESI / RS485-plug-in card ESI-protocoll
586194	V-ESI / RS232/RS485 plug-in card ESI-protocoll
586171	RS232-cable PC-> V-ESI 2x9 pin, 2m
586174	RS485-cable open end -> B-ESI 1x9-pin, 2m
586175	Wiring 586174 to 586174 incl. terminal resistance, each station
586179	each additional meter cable RS232/RS485



Wiring diagramm (with external terminal resistors at the first and last unit)

Specifications	
Operating voltage	DC 5V ±5%, stabilized
Power consumption	approx. 150mA
LED-display	Watch-Dog (M3, yellow), RS485-Receive (M2, red), RS232-RxD/TxD (V-ESI) / RS485-Send (B-ESI) (M1, green)
Data transmission rate	max. 57600 Baud
RS232-interface (only V-ESI)	9pin SubD
RS485-interface	9pin. SubD, electrically isolated
I/O-interface	20-pin plug-in connection

Download our free of charge installation software B-ESI from our homepage.



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AS-i-Fieldbus-Optocoupler-Module DIAS4/DIAS8

The modules DIAS4 and DIAS8 provide digital, via optocouplers electrically isolated inputs for the actuator sensor interface (AS-i) fieldbus. Thus switching states can be transmitted to any AS-i master by sensors such as reed switch, light barriers, limit switch etc... . DIAS4 has 4 inputs and occupies one slave-address in the AS-i-fieldbus-system, DIAS8 has 8 digital inputs in the same housing and occupies two slave-addresses. The installation is extremely easy: a two-pole connection is sufficient - operating voltage and data are transmitted on the same line. The slave addresses can be selected freely.

- *Inputs electrically isolated via optocoupler*
- *Simple connection at AS-i-fieldbus*
- *Current supply via AS-i-fieldbus master*
- *Slave-address(es) freely selectable*
- *Address(es) are saved in EEPROM*
- *Extremely compact housing for 35mm DIN-rail*

5

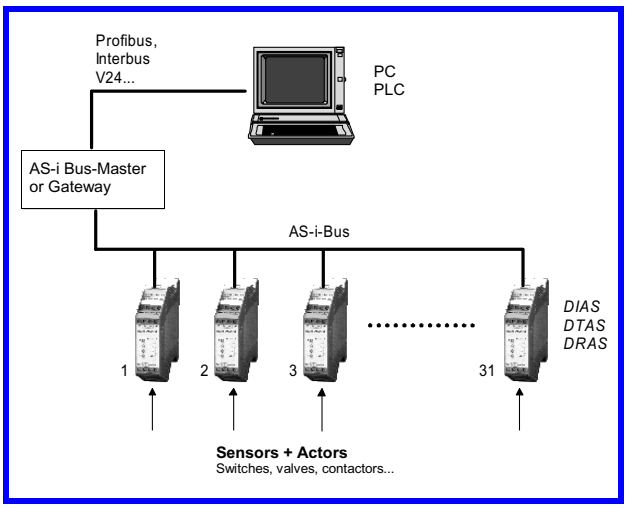
Structure

The whole electronics is integrated in just a 22.5 mm broad housing for a 35mm DIN rail. The input conditions can be controlled by light emitting diodes at the front side of the device.

It was attended to a strict galvanic separation between the input circuits and the AS-i bus.

The AS-i-fieldbus

This was established in 1990 with the intention of being able to connect actuators and sensors by a two-wire line with PLC or computers in a simple manner. A yellow flat cable, which length may be up to 100m, developed particularly for the AS-i fieldbus, permits the connection of the AS-i components polarity-safe by an insulation displacement connection technology. A bus master can communicate with up to 31 slaves, whereby the bus structure is arbitrary: tree -, line -, star or mixed structures are permissible. The current supply for the slaves can also be taken from the AS-i fieldbus; the rated voltage is 30V, the sum current for all slaves is at maximum 2.4A.



DIAS4 and DIAS8 in the AS-i-fieldbus

AS-i fieldbus protocol is very simple. Data is transmitted in packages, in which the address of the slave and 4 bits user data are merged. Error protection and bus monitoring are made automatically by the master, without the user must worry about it.

DIAS4 and **DIAS8** are sensor-slaves, which transmit four respectively eight digital input signals to the AS-i fieldbus. If no voltage is applied to the input terminals, the four data bits “0 0 0 0” are transferred to the AS-i fieldbus-master. If the voltage of DC 10..30V is applied to the input E1 (respectively E1_1 or E2_1), the least significant data bit receives the condition log. 1, thus the “0 0 0 1” is transmitted to the master. Accordingly the “0 0 1 0” will be transmitted, when E2 receives a high-signal, “0 1 0 0” with active E3 and “1 0 0 0”, when E4 is supplied with voltage.

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AS-i-Fieldbus-Optocoupler-Module DIAS4/DIAS8

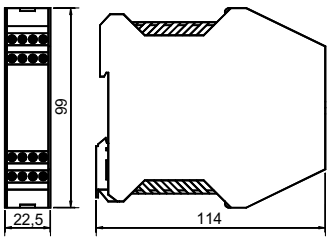
Connecting to the AS i fieldbus, projecting

The devices are connected to the AS-i-bus with the integrated terminal block. Via an adapter the connection to the yellow AS-i cable is also possible by insulation displacement connection technology. **The DIAS4** is delivered with the slave address 0 and can be integrated into an existing AS-i system by assigning a free address number to it. This is done by the master in the projecting mode. Consider the operating instructions of your AS-i master for this procedure. Also at **the DIAS8** both slave addresses are delivered with „0“. For changing the address the jumper at the housing side must be pulled, then both AS-i slaves can separately be projected via the ports "PRJ1 " and " PRJ2 ". In the operating mode the jumper is plugged in, so that both slaves can be addressed via one line.

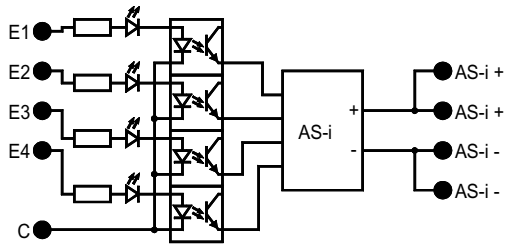
Connecting the inputs:

The **DIAS4** has four inputs, each with a terminal for the positive voltage potential (E1..E4) and a common 0V-terminal (C). The **DIAS8** comprises two groups with 4 inputs each. Per group also four terminals for the positive potential (E1_1.. E1_4 and E2_1..E2_4) and one common 0V-terminal each (C1 and/or C2) are present.

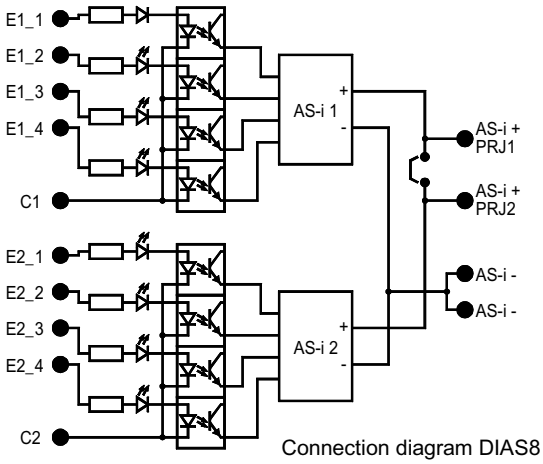
The inputs recognize a logic 1, if a voltage between DC 10V and 30V is applied.



Order-No	Type
586340	DIAS4
586341	DIAS8



Connection diagram DIAS4



Connection diagram DIAS8

Specifications	
Operating voltage	DC30V, via AS-i-bus
Power consumption via AS-i-bus:	DIAS4: approx. 20mA DIAS8: approx. 40mA
AS-i-slave-profil	ID-Code 0; E/A-configuration 0
Input voltage	DC10V - 30V
Power consumption	max. 8mA each input
LED´s	each input 1 x yellow
Terminals	2 x AS-i +, 2 x AS-i - DIAS4: 4 x pos. connection of the inputs E1..E4 and one common 0V-connection C DIAS8: 8 x pos. connection of the inputs E1_1..E1_4 and E2_1..E2_4, each group one common 0V-connection C1 / C2
Temperature range	0 - +50°C
Installation position	as required
Protection	IP20
Weight	approx. 110g

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AS-i Fieldbus Relay-Output Module DRAS4

The module DRAS4 provides four relay change-over contacts for the actuator-sensor-interface (AS-i)bus. Thus any AS-i master can serve actors like motors, contactors, heatings, pumps and so on. The installation is extremely easy: a two-pole connection is sufficient - operating voltage and data are transmitted on the same line. The slave addresses can be selected freely.

- *Minimum wiring effort*
- *Highly reliable power relays*
- *LED-Display for each output*
- *Simple connection at AS-i-fieldbus*
- *Current supply via AS-i-fieldbus master*
- *Slave-address(es) freely selectable*
- *Address(es) are saved in EEPROM*
- *Extremely compact housing for 35mm DIN-rail*
- *Integrated Watchdog-timer*

5

Structure

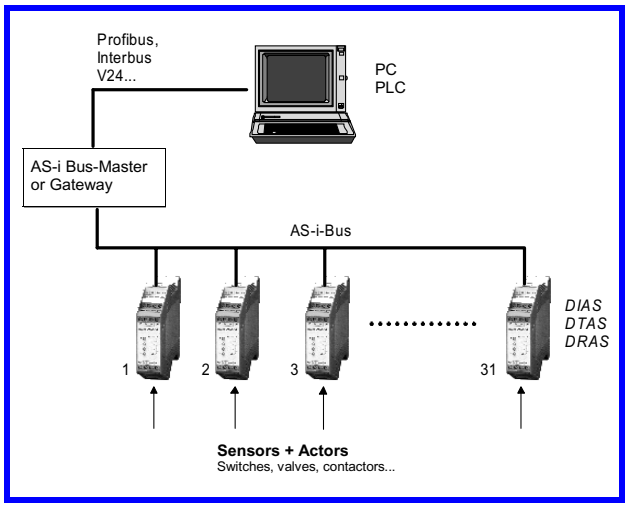
The whole electronics is integrated in just a 22.5 mm broad housing for a 35mm DIN rail. The output conditions can be controlled by light emitting diodes at the front side of the device.

It was attended to a high isolation between the relays-contacts and the AS-i bus, testing voltage: 4kV.

The AS-i-fieldbus

This was established in 1990 with the intention of being able to connect actuators and sensors by a two-wire line with PLC or computers in a simple manner. A yellow flat cable, which length may be up to 100m, developed particularly for the AS-i fieldbus, permits the connection of the AS-i components polarity-safe by an insulation displacement connection technology. A bus master can communicate with up to 31 slaves, whereby the bus structure is arbitrary: tree -, line -, star or mixed structures are permissible. The current supply for the slaves can also be taken from the AS-i fieldbus; the rated voltage is 30V, the sum current for all slaves is at maximum 2.4A.

AS-i fieldbus protocol is very simple. Data is transmitted in packages, in which the address of the slave and 4 bits user data are merged. Error protection and bus monitoring are made automatically by the master, without the user must worry about it.



DRAS4 in the AS-i-Bus

The **DRAS4** is an actuator slave which provides four isolated relay contacts designed as change-over contacts. These are controlled by the AS-i master which transmits the corresponding bit pattern in the 4-bit user data. Relay No. 1 will switch on if the least significant bit is a logical 1, that is the transmission of “0 0 0 1” . According to this relay No. 2 will switch on if “0 0 1 0”, relay No. 3 at “0 1 0 0” and relays No. 4 at “1 0 0 0”.

The integrated *watchdog timer* switches off all outputs in case of master transmission failure (cable break or permanent protocol errors) or memory errors.

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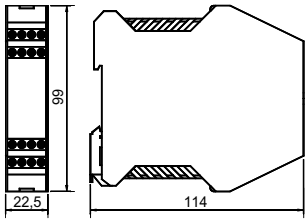
AS-i-Fieldbus Relay-Output Module DRAS4

Connecting to the AS i fieldbus, projecting

The devices are connected to the AS-i-bus with the integrated terminal block. Via an adapter the connection to the yellow AS-i cable is also possible by insulation displacement connection technology. The **DRAS4** is delivered with the slave address 0 and can be integrated into an existing AS-i system by assigning a free address number to it. This is done by the master in the projecting mode. Consider the operating instructions of your AS-i master for this procedure.

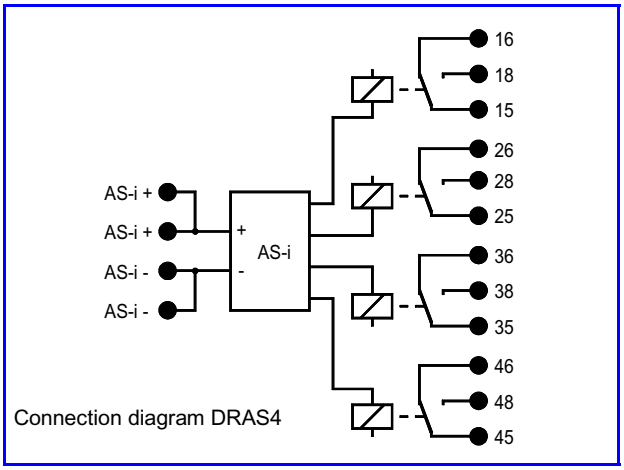
Connecting the outputs

The **DRAS4** features four relays with change-over contacts. The N/C-contacts are connected with the terminals x5-x6, the N/O-contacts are connected with x5-x8. For the switching of inductive loads a protection, e.g. a varistor, is neccessary to protect the relay contacts against welding or burning off of the contacts by voltage spikes.



Order-No	Type
586300	DRAS4

Specifications	
Operating voltage	DC 30V, via AS-i-Bus
Power consumption via AS-i-Bus	max. 90mA
AS-i-slave-profile	ID-code 0; I/O-configuration 8
Switching capability	AC 250V, max. 8A, max. 2000 VA DC 24V, 3A / 60V, 0,7A / 115V, 0,3A
Contact material	AgNi
Contact life time	mechanical 3 x 10^7 cyclen electrical 10^5 cycles
LED´s	Each output ,1 x yellow
Terminals	2 x AS-i +, 2 x AS-i - Each output 1 x change over contact
Temperature range	0 - +50°C
Installation position	as required
Protection	IP20
Weight	approx. 150g



Connection diagram DRAS4

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AS-i-Bus Transistor Module DTAS4/DTAS8

The modules DTAS4 and DTAS8 provide isolated transistor outputs with short-circuit and over-temperature protection for the actuator sensor interface (AS-i) bus. Thus any AS-i master can serve actuators like magnetic valves, small DC motors, light announcers and so on.. DTAS4 has 4 inputs and occupies one slave-address in the AS-i-fieldbus-system, DTAS8 has 8 digital inputs in the same housing and occupies two slave-addresses. The installation is extremely easy: a two-pole connection is sufficient - operating voltage and data are transmitted on the same line. The slave addresses can be selected freely.

- *Minimum wiring effort*
- *Outputs electrically isolated via optocoupler*
- *Integrated short-circuit and over-temperature protection*
- *Simple connection at AS-i-fieldbus*
- *Current supply via AS-i-fieldbus master*
- *Slave-address(es) freely selectable*
- *Address(es) are saved in EEPROM*
- *Integrated watchdog-timer*

5

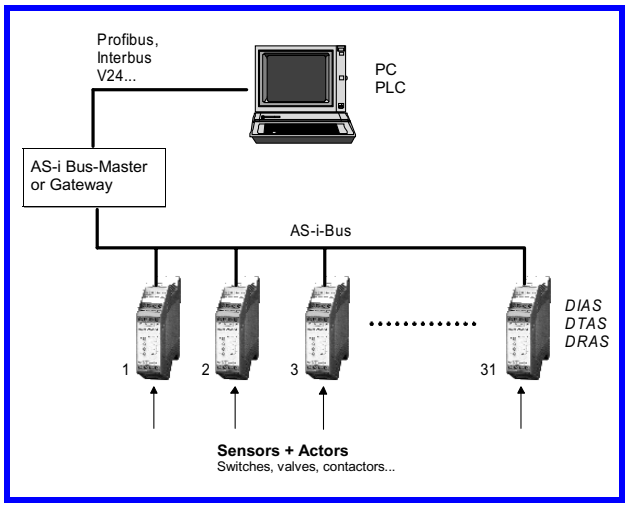
Structure

The whole electronics is integrated in just a 22.5 mm broad housing for a 35mm DIN rail. The output conditions can be controlled by light emitting diodes at the front side of the device.

It was attended to a strict galvanic separation between the input circuits and the AS-i bus.

The AS-i-fieldbus

This was established in 1990 with the intention of being able to connect actuators and sensors by a two-wire line with PLC or computers in a simple manner. A yellow flat cable, which length may be up to 100m, developed particularly for the AS-i fieldbus, permits the connection of the AS-i components polarity-safe by an insulation displacement connection technology. A bus master can communicate with up to 31 slaves, whereby the bus structure is arbitrary: tree -, line -, star or mixed structures are permissible. The current supply for the slaves can also be taken from the AS-i fieldbus; the rated voltage is 30V, the sum current for all slaves is at maximum 2.4A.



AS-i fieldbus protocol is very simple. Data is transmitted in packages, in which the address of the slave and 4 bits user data are merged. Error protection and bus monitoring are made automatically by the master, without the user must worry about it.

DTAS4 and DTAS8 in the AS-i-Bus

DTAS4 and **DTAS8** are actuator slaves which provide four resp. eight permanently short-circuit proof and overtermperature protected transistor outputs. These are controlled by the AS-i master which transmits the corresponding bit pattern in the 4-bit user data. A1 (resp. A1_1 or A2_1) will switch on if the least significant bit is a logical 1, that is the transmission of “0 0 0 1”. According to this A2 will switch on at “0 0 1 0”, A3 at “0 1 0 0” and A4 at “1 0 0 0”.

The integrated wachtdog timer switches off all outputs in case of master transmission failure (cable break or permanent protocol errors) or memory errors.

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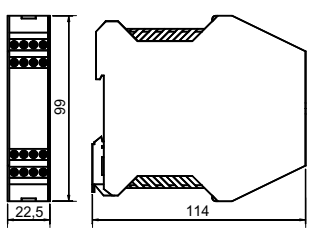
AS-i-Bus Transistor Module DTAS4/DTAS8

Connecting to the AS i fieldbus, projecting

The devices are connected to the AS-i-bus with the integrated terminal block. Via an adapter the connection to the yellow AS-i cable is also possible by insulation displacement connection technology. **The DTAS4** is delivered with the slave address 0 and can be integrated into an existing AS-i system by assigning a free address number to it. This is done by the master in the projecting mode. Consider the operating instructions of your AS-i master for this procedure. Also at **the DTAS8** both slave addresses are delivered with „0“. For changing the address the jumper must be pulled, then both AS-i slaves can separately be projected via the ports "PRJ1 " and " PRJ2 ". In the operating mode the jumper is plugged in, so that both slaves can be addressed via one line.

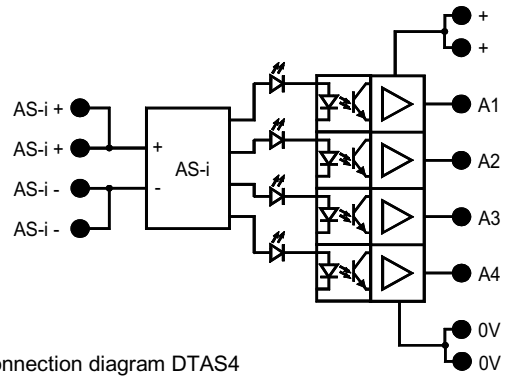
Connecting the outputs:

The DTAS4 features four high side outputs with one terminal for the switched signal (A1..A4) each and two internal connected terminals for applying the output voltage (+ and 0V) to be switched. The DTAS8 provides eight high side outputs. The switched signals can be taken from the terminals A1_1...A1_4 and A2_1..A2_4. The voltage to be switched again is applied at the terminals + and 0V (2 for + and 2 for 0V, internally connected). The output voltage may be DC 30V at maximum, the maximum current per output is 0,5A

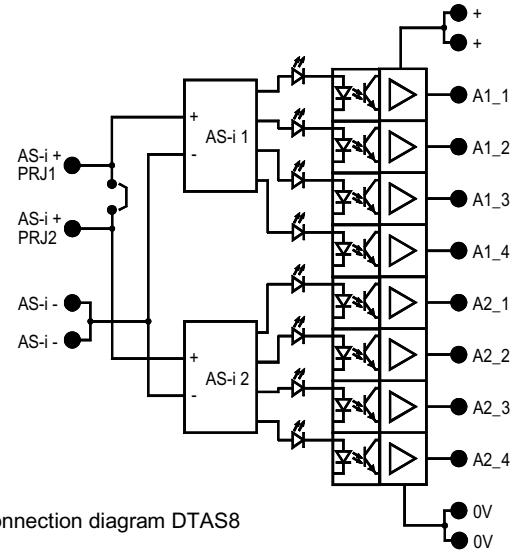


Order-No	Type
586320	DTAS4
586321	DTAS8

Specifications	
Operating voltage	DC30V, via AS-i-bus
Power consumption via AS-i-bus:	DTAS4: approx. 30mA DTAS8: approx. 60mA
AS-i-slave-profile	ID-Code 0; I/O-configuration 8
Switching capability of the outputs	DC10 - 30V; 0,5A permanently short-circuit proof
LED´s	Each output 1 x yellow
Terminals	2 x AS-i +, 2 x AS-i - DTAS4: 4 x switching output A1..A4 2 x + für for positiv voltage and 2 x 0V for ground of the output voltage DTAS8: 8 x switching output A1_1..A1_4 und A2_1..A2_4 2 x + for positiv voltage and 2 x 0V for ground of the output voltage
Temperature range	0 - +50°C
Installation position	As required
Protection	IP20
Weight	approx. 110g



Connection diagram DTAS4



Connection diagram DTAS8

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